

PINBALL COCKTAIL TABLE GAME



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1.1 Warnings

1.1

1.1.1 Machine should be plugged ONLY into a grounded outlet.

1.1.2 The power cord has a ground pin to prevent electrical shock. DO NOT DEFEAT ITS PURPOSE by removing that pin! (See illustration 1-1 paragraph 1.4)

1.1.3 If you must use an extension cord to plug the game into a suitable electrical outlet, the plug MUST HAVE WITHOUT EXCEPTION three (3) prongs, and the cord itself must be MEDIUM to HEAVY GAUGE! (14 to 16 gauge)

Thin-wired "household" extension cords are not adequate because they usually are not grounded (3-prong). This could affect the game by not being able to handle the amount of power required by the power supply.

1.1.4 Additionally, improper grounding may affect the operation of the game.

1.1.5 It is imperative that everyone servicing this machine must remember and practice at all times certain safety requirements:

Do NOT work on this machine while wearing wet shoes or wet clothing, bulky rings or necklaces . . . and if your skin is wet or moist, do NOT touch this machine.

Only when the above personal conditions have been completely corrected, then you may proceed with the servicing of the machine.

1.2 Tools Package

1—Longnose pliers

1—Wire Stripper

1—5/16" nut driver

1—3/16" nut driver

1—Phillips screwdriver #1 tip

1—Phillips screwdriver #2 tip

1—Switch contact adjuster

1—Volt/Ohm/Meter

1—Soldering Iron (25-watt)

1.3 Set-Up Procedures—Cocktail Table

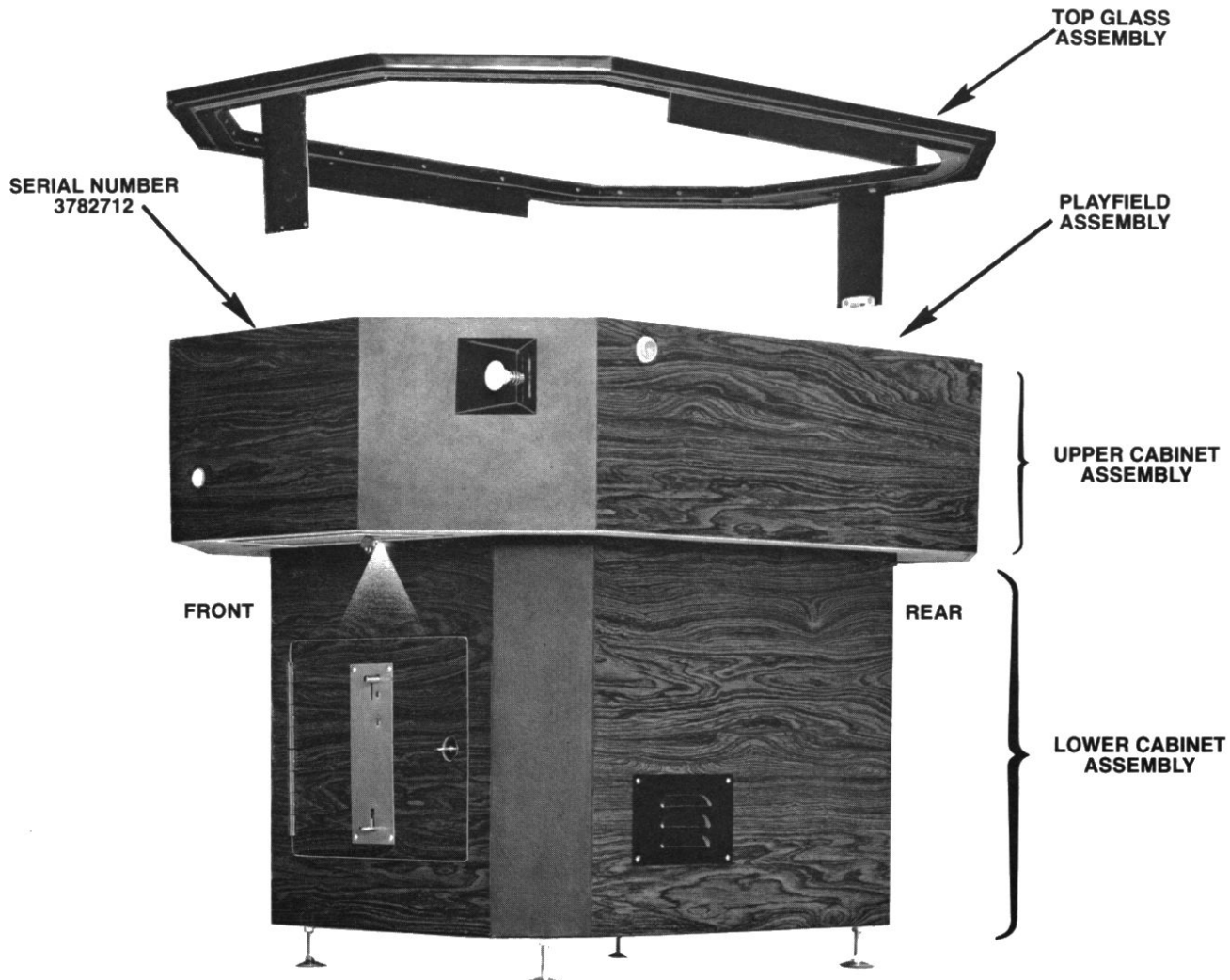
1.3

Three (3) keys to the game are tied to the plunger. A fourth key is on a wire hanger inside the COIN DOOR. Two of the keys on the plunger are #8013, and are identical. The third key is for the COIN DOOR. . . and the fourth key is identical with the third key.

The #8013 keys fit all locks except the COIN DOOR. The FRONT access door is immediately above the COIN DOOR (below the SHADOW BOX). The REAR access door is in the same position at the REAR side of the game (see illustration #1-A).

To remove the top glass:

- (1) Take off the access doors front and rear.
- (2) Free the latches front and rear (see illustration #1-B)
- (3) Lift the glass straight UP (see illustration #1-C)



MAJOR ASSEMBLIES OF THE COCKTAIL TABLE GAME

WARNING: You must touch System Ground before attempting adjustments

5.0 UPPER CABINET

- 5.1 Ball Plunger**
- 5.2 Flipper Activator Switch**
- 5.3 Credit Switch**

6.0 LOWER CABINET

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- 6.4 Chime**
- 6.5 Coin Door**

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 - 7.3.2 Test Mode Two (Stuck Switch & Switch Verification Test)**
 - 7.3.3 Test Mode Three (Vibration Test)**
 - 7.3.4 Test Mode Four (Lamps Test "A")**
 - 7.3.5 Test Mode Five (Lamps Test "B")**
 - 7.3.6 Test Mode Six (LED's & Lamps Test "A")**
 - 7.3.7 Test Mode Seven (LED's & Lamps Test "B")**
 - 7.3.8 Test Mode Eight (Lamps Test "C")**
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8.0 TROUBLE-SHOOTING GUIDE

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1.0 INTRODUCTION

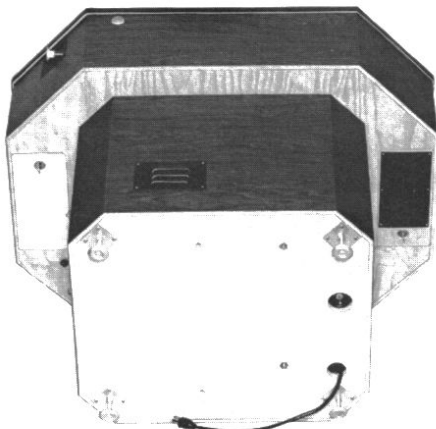
The pinball game described in this manual was designed with the benefit of the latest technology whereby many potential service problems have been eliminated.

Additionally the game is equipped with a self-diagnostic system which aids in easy isolation of problems when they do occur. As with all mechanical assemblies, of course it will be necessary from time to time to replace worn-out parts.

This manual contains a complete listing of parts. When placing an order, please BE SURE to include exact and complete parts numbers, description and name of the game (and the serial number of the machine).

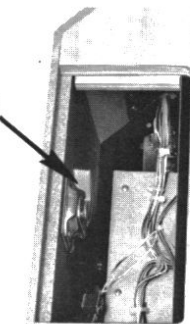
FROM TIME TO TIME CHANGES AND/OR IMPROVEMENTS REFLECTING ADVANCES IN TECHNOLOGY MAY BE MADE IN CURRENT PRODUCTION MODELS. INSERT SHEETS REFLECTING THESE CHANGES WILL BE AVAILABLE UPON REQUEST.

1-A

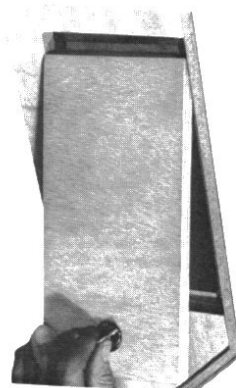


1.3

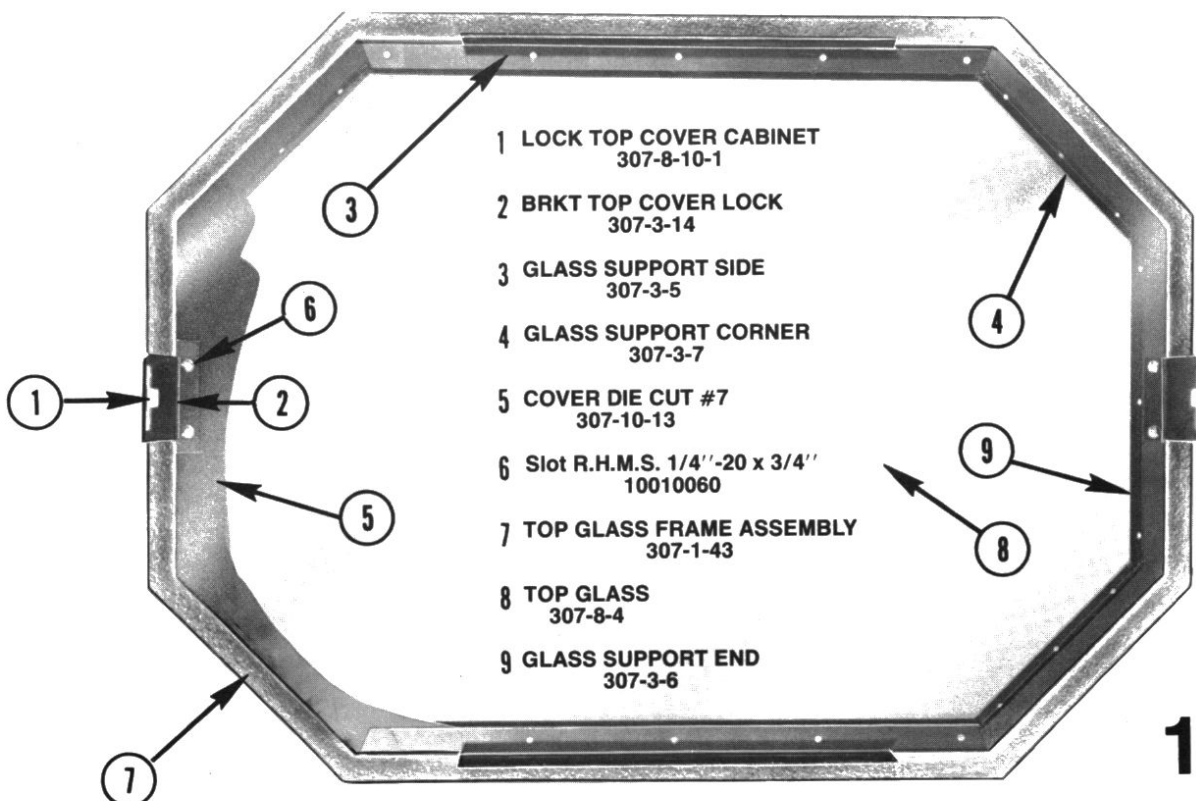
SASH LOCK
307-8-10



1-B



1-C



1-D

TOP GLASS COMPLETE ASSEMBLY

307-1-14

WARNING: You must touch System Ground before attempting adjustments

1.4 What To Do Before Applying Power

1.4

To open the PLAYFIELD, place both hands palms-up underneath the SHADOW BOX at the FRONT of the game, and lift UPWARD (see illustration #1-E) until it locks in the bracket at the back of the UPPER CABINET (see illustration #1-F).

The POWER CORD is tied to the CASH BOX inside the machine. Cut the tie, and pass the cord through the small hole at the BACK LEFT of the power supply assembly (see illustration #1-G).

NOTE: Later models have dust-prevention plate over power-cord hole.

The ON-OFF switch is located at the BACK underneath and to the LEFT . . . immediately underneath the yellow cap on the power supply (see illustration #1-H).

BEFORE plugging the line cord into the electrical outlet, the following items should be visually checked for possible minor troubles caused by handling during shipment:

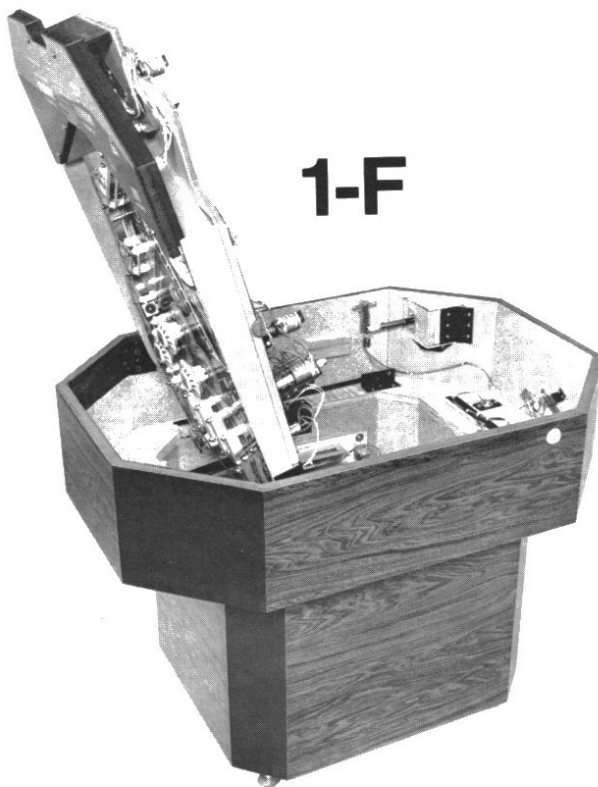
- (1) Fuses should be firm and make good contact.
- (2) All connectors should be completely seated.
- (3) Wires should be clear of all moving parts.
- (4) No wires or foreign objects of any kind should be hanging or lying loose inside the game.



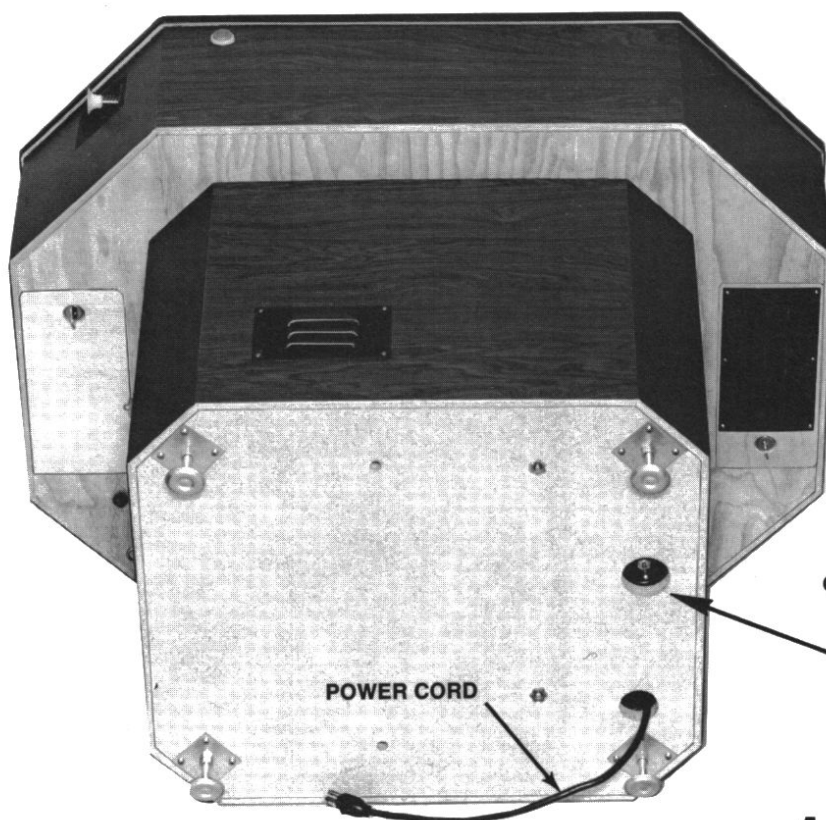
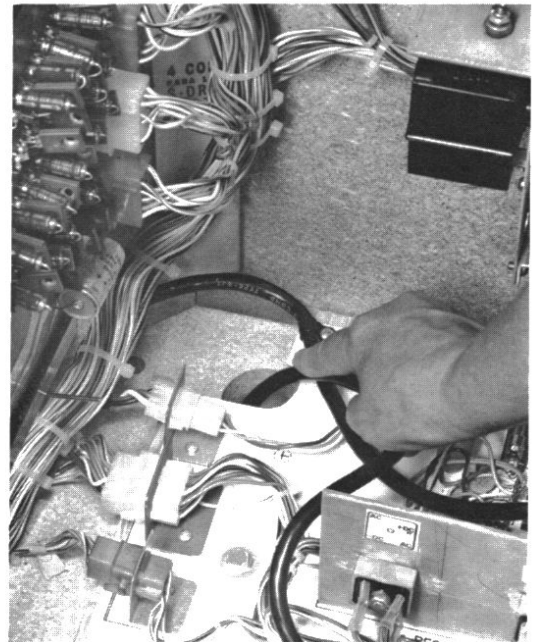
1-E

1-4

1-F



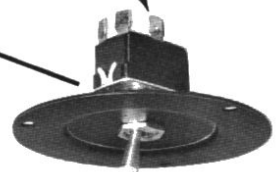
1-G



1-I



ON/OFF POWER SWITCH



1-H

WARNING: You must touch System Ground before attempting adjustments

1.5 Parts Package

1.5

Two (2) balls and one set of four (4) leg levellers with nuts are located inside the CASH BOX. One ball should be placed inside the ROLL-TILT bracket as indicated (see illustration #1-J). The second ball should be put into the OUT-HOLE KICKER (see illustration #1-K).

The four nuts should be screwed onto the respective leg levellers, and then the levellers inserted into the threaded holes beneath the cabinet, and adjusted so that the game stands steady (see illustration #1-L).

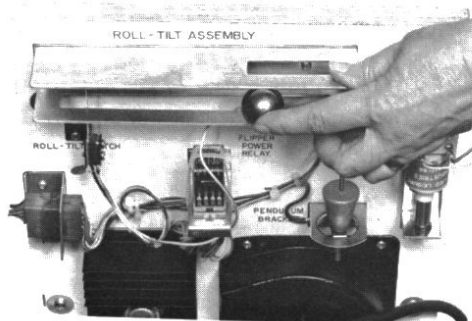
The normal position is when the game stands level. However, it should be noted that

- (1) Raising rear legs will increase ball speed and will decrease scores.
- (2) Lowering rear legs will decrease ball speed and will increase scores.

We recommend raising rear legs about half-way up (1 1/2-2" off the floor) to have nice ball action and reasonable scores.

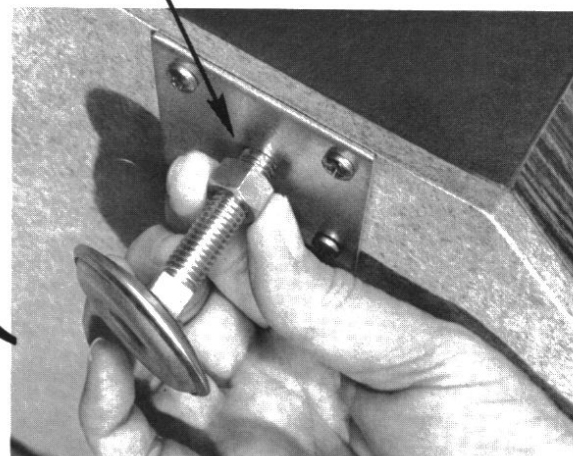
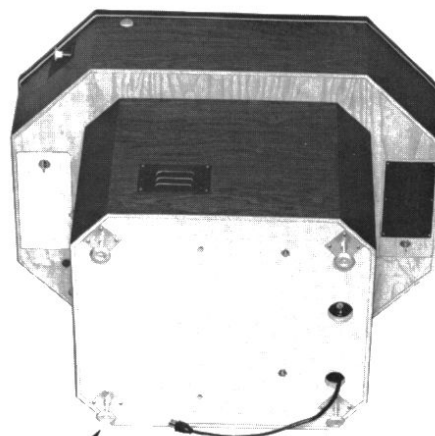
NOTE: Be sure to adjust roll and pendulum tilts after raising the rear legs.

1-J



1-L

LEVELLER



1-K

OUT-HOLE KICKER



WARNING: You must touch System Ground before attempting adjustments

Access door	One each at front & back of lower cabinet ... see illustration #1-B
Activate	Energize.
Add-A-Ball	An extra ball may be awarded on special scores depending on how machine is set.
Background Lamps	Lights on playfield with no special function.
Ball in Play	Ball is currently operating on playfield.
Bonus	Extra points accumulated during play & added to player's score at end of ball.
Bonus Light	Reflects special scoring in process.
Bull's-eye target	A scoring device mounted on a switch attached to playfield.
Burnishing tool	A low-abrasive strip of fiberboard coated with grit. Used to clean contact points.
Chime	Audio mechanism ... refer to paragraph 6.4 illustration #6-E.
Circuit	A closed network of conductors through which electric current can flow.
Coil	Many turns of insulated wire wound on a spool.
Coining	Placing suitable coin in the Coin Slot to result in GAME READY status.
Coin Return Slot	When coin is rejected, you may recover it from this location (front door).
Collect Value Target	Special scoring may be won. Refer to paragraph 3.4.1.
Counter	Located in Lower Cabinet ... registers number of games played.
Contact	An attachment to a switch blade which provides a low resistance point of contact.
Credit	There are several credit options. Credit can mean "games available for play". Refer to paragraph 2.2.
Credit Button	Press this button on front of game to transfer a game for play from Credit Display (once for each player).

Credit Display	This display on shadow box shows how many games are available for play.
Credit Switch	Attached to credit button . . . enables game to start.
Double Bonus	BONUS "x2".
Drop Target	A scoring device on playfield.
Energize	To activate or to grant power.
Entrance Gate	A one-way device that allows the ball to enter the playfield.
Exit Alley	The passageway on the left & right sides of playfield by which ball leaves playfield.
Flipper	Bat-type lever on lower playfield . . . used to manipulate ball.
Flipper button	Control on flipper arm . . . located on each side of upper cabinet (left/right).
Fuse	A protective device that opens a circuit whenever there is excessive flow of current.
Game Klocker	This assembly makes sound when credit is added to credit display.
Gap	Space between set of contact points.
Harness	A group of color-coded wires which connect various electronic components.
Insulator	Material that does not conduct electrical current.
Jumper	A wire used to connect two or more points.
LED	A semi-conductor emitting a non-incandescent light (light emitting diode).
Lower Cabinet	Contains cash box & coin counter, computer logic board & these assemblies: roll-tilt, power supply, chime and coin door.
Main Computer Board	Printed circuit board in lower cabinet . . . controls electronics.
Out-Hole	Hole at bottom of playfield from which ball is kicked into shooter alley.

Out-Hole Kicker	Solenoid-operated device used to propel the ball into Shooter Alley.
P. C. Board	Printed circuit board.
Pitted Contacts	Severely damaged contacts (see "Contacts").
Playfield	Playing area of game.
Plunger	Spring-loaded mechanism that propels ball up Shooter Alley onto playfield.
Power Up	Application of electrical power to machine.
Rebound Kicker	Reverses the ball's direction of travel.
Rejector	Refuses to accept coins when they are not correct.
Replay	Special option available under certain conditions. Refer to paragraph 3.0 and 3.1.
Re-set	Trouble-shooting may be involved. Please refer to paragraph 8.1.
Roll-over Switch	Bent wire protruding slightly above the playfield surface/has scoring function.
Roll-Tilt	A tilt device to prevent abuse in an effort to prolong the game.
"Same Player Shoots Again"	The person who is playing will have the opportunity to shoot an extra ball after the ball in play.
Schematic	Drawing showing wiring of components by means of a shorthand system of symbols and lines.
Score Display	Printed circuit boards that display points scored.
Score Glass	Score cover.
Self-Diagnostic	Identifying the problem from its own symptoms.
Self-Test	A procedure used to identify problems. See "self-diagnostic".

Shadow Box	An assembly on which are mounted the CREDIT and SCORE displays and also the "Game Over" and "Tilt" lamps.
Shooter Alley	Plunger propels ball upward in this area to accomplish entrance onto playfield.
Slam Switch	When the game is jarred or bumped, this switch ends game immediately.
Sleeve	A replaceable liner inside a solenoid.
Sling Shot	See "Rebound Kicker".
Solenoid	See "Coil".
"Special When Lit" Light	Shows possible Replay/Add-A-Ball status.
Squirrel Cage	Fan Blade.
Sunflower Cap	Thumper bumper cover . . . marked on top to indicate points scored when hit.
Thumper Bumper	Three scoring targets on the playfield which are in heavy action adding to the score.
Tilt	Self-protective device built into game to discourage abuse of machine.
Transformer	Electrical component used primarily to adjust voltage ratios up or down.
Triple Bonus	BONUS "x3".
Upper Cabinet	Contains plunger assembly, flipper activator switch assembly, credit switch assembly and playfield assembly.
Wafer	A thin plastic disc at base of thumper bumper. When bumped by ball, it activates the switch.

2.0 GENERAL GAME OPERATION

2.0

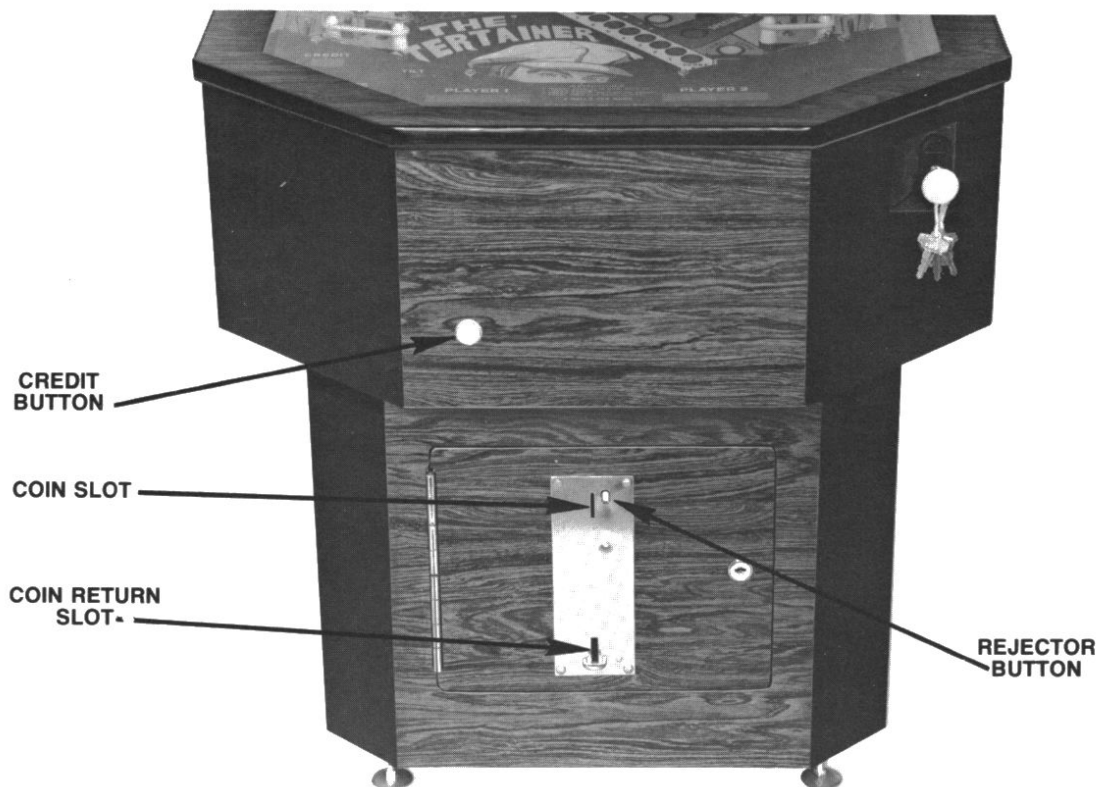
2.1 Coining The Game (Coin insertion)

Coin enters the game through the COIN ACCEPTANCE slot located in the FRONT door (see illustration #2-A). When a coin is accepted, the TOTAL PLAY COUNTER advances, and there is a "knocking" sound caused by the GAME KNOCKER. This tells us that the game has recognized the coin.

The CREDIT DISPLAY advances one if the game is adjusted for "one coin—one credit". If the coin is not accepted, it is returned when the REJECTOR button is pressed, and it may be picked up from the "Coin Return Slot". Additional coins will advance credit one at a time.

Pressing the CREDIT button on the FRONT of the cabinet will cause the OUT-HOLE KICKER (see illustration #1-J) to serve the ball to the SHOOTER ALLEY (see illustration #2-B).

A credit is subtracted from the CREDIT DISPLAY for each time the CREDIT button is pressed. A maximum of two (2) players can be selected to play at the same time.



2-A

FRONT OF GAME

The first "BALL IN PLAY" LED is lit. The GAME OVER lamp goes OFF, and the first player's score flashes. This indicates that the game is ready for play.

Shooting the ball initiates PLAY by closing the GAME START ROLL-OVER switch in the middle of the SHOOTER ALLEY.

WARNING: You must touch System Ground before attempting adjustments

PLAYFIELD 307-1-5

2.2



WARNING: You must touch System Ground before attempting adjustments

DESCRIPTION OF PARTS IN PLAYFIELD
(Illustration #2-B)

2.2

LOCATION	PART NUMBER	DESCRIPTION	
1	312-6-1	Playfield wood	
2	292-1-6	Rebound assembly gate	
3	307-10-7	Die cut #2	
4	264-5-26	Playfield bumper post	
✓ 5	264-8-31	Rubber ring 2 1/2"	3 0.75
✓ 6	264-8-30	Rubber ring 1 1/2"	4 .50
7	307-4-3	Side rail #1	
✓ 8	235-8-104	Rubber ring 2"	3 .75
9	307-10-11	Die cut #5 RH	
✓ 10	235-8-107	Rubber ring 3 1/2"	3 .75
11	307-4-4	Side rail #2	
12	307-10-9	Die cut #3 RH	
13	307-4-7	Rail ball drain RH	
14	307-6-4	Ball plunger cover	
15	307-6-1	Score glass	
16	10140010	No. 6-32 x 5/16" cap nut	
17	307-4-8	Rail ball drain LH	
18	307-10-10	Die cut #4 LH	
✓ 19	235-8-107	Rubber ring 3 1/2"	
20	307-10-12	Die cut #6 LH	
✓ 21	264-8-31	Rubber ring 2 1/2"	
22	264-3-22	Ball guide bracket #1	
23	307-4-5	Side rail #3	
24	307-10-8	Die cut #1	
25	264-1-17	Rebound bumper assembly	
26	264-8-20-18	Plastic guide (yellow)	
27	307-8-3	Top ball guide	
✓ 28	264-8-10	Rubber ring 3/8"	15 .35
FLIPPER RUBBER RING			.75

WARNING: You must touch System Ground before attempting adjustments

2.2 Understanding The Playfield

2.2

The game has a total of twenty (20) scoring devices:

- 8 ... Roll-over Switches
- 3 ... Thumper Bumpers
- 3 ... Bull's-eye Targets
- 4 ... 10-point Switches
- 2 ... Rebound Kickers

The only function of three (3) of these roll-over switches is to score 500 points each:

The right entrance switch located close to the ENTRANCE GATE, and the left and right EXIT switches located in the respective EXIT alleys. The computer recognizes these switches as #210.

The middle ENTRANCE GATE switch is #240, which scores 1000 points and advances BONUS. It also performs a special function as outlined in paragraph 2.4.2. Switch #170 scores 500 points, advances BONUS, and also performs another function (please see paragraph 2.3). Switch #180 does exactly the same: it scores 500 points, advances BONUS, and also performs another function (please see paragraph 2.3). The remaining ENTRANCE GATE switches #220 and #230 each scores 500 points and performs a special function as outlined in paragraph 2.3.

The three (3) THUMPER BUMPERS each score 100 points. They are further identified as switch #10 located LEFT ... #20 located MIDDLE ... and #30 located RIGHT. Both #10 and #30 perform special functions also: the LEFT thumper bumper registers on the LEFT bank of COLLECT VALUE target lamps, and the RIGHT thumper bumper registers on the RIGHT bank of COLLECT VALUE target lamps.

#40 COLLECT VALUE bull's-eye target covers the LEFT or LOWER bank of COLLECT VALUE lamps ... and #50 COLLECT VALUE bull's-eye target covers the RIGHT or UPPER bank of COLLECT VALUE lamps.

#40, when hit by the ball, will register 1000 points per lamp number. For instance: if lamp #3 is on, then #40 target will register 3000 points, and also advance the BONUS. #50 operates in exactly the same manner.

The remaining BULL'S-EYE target scores 500 points and advances the BONUS. It is called the SPECIAL WHEN LIT target, and also performs a special function (please see paragraph 2.4.1).

There are four (4) side switches identified as "150" ... they each score 10 points.

#60 and #70 are REBOUND KICKER switches, and each scores 10 points.

2.3 Bonus

In the middle of the PLAYFIELD is a series of lamps numbered 1-10. Each time an advance BONUS switch is activated, the BONUS bank of lamps progress one at a time. The BONUS points are collected when the ball goes into the OUT-HOLE KICKER. The BONUS lamps represent 1,000 points each, ranging from 1 to 10.

2.3.1 DOUBLE BONUS is obtained by knocking down all four (4) DROP TARGETS to the surface of the PLAYFIELD. The DOUBLE BONUS lamp comes ON. If this action is repeated during the course of the SAME ball, the DOUBLE BONUS lamp goes OUT, and the TRIPLE BONUS lamp comes ON. The DROP TARGET switches are numbered #250, #260, #270 and #280, going left to right in direction.

2.3.1

DOUBLE BONUS means that the points accumulated in the BONUS bank would be "x2". TRIPLE BONUS means "x3". For instance: BONUS lamp #5 is ON... the DOUBLE BONUS would mean that, at the end of that ball, an additional 10,000 (5x2) points would be added to the player's score. Likewise on the TRIPLE BONUS with the same lamp #5 ON: an additional 15,000 (5x3) points would be added to the player's score.

2.3.2 Drop Target

Each one scores 500 points when knocked to the surface of the PLAYFIELD. When the final fourth one is struck, all DROP TARGETS automatically re-set.

The DROP TARGETS can also be raised individually when the ball rolls over the following switches:

- (1) Switch #170 raises "A".
- (2) Switch #220 raises "B".
- (3) Switch #230 raises "C".
- (4) Switch #180 raises "D".

2.4 Special Features

2.4.1 Collect Value

When both 4's are lighted, the SPECIAL WHEN LIT lamp comes ON. If, during this time, the SPECIAL WHEN LIT target is hit, the game gives either a FREE BALL or a FREE GAME, depending on the way the game is set.

The upper Collect Value lamps advance each time the right Thumper Bumper scores... the lower Collect Value lamps advance each time the left Thumper Bumper scores.

If the game is set on ADD-A-BALL, the SAME PLAYER SHOOT AGAIN lamp comes ON. This means that, at the end of that ball, the player has a chance to shoot the FREE BALL.

If the game is set on REPLAY, a credit is added to the CREDIT DISPLAY.

2.4.2 Extra Ball When Lit

On the last ball, the EXTRA BALL WHEN LIT lamp located immediately above the Switch #240 goes ON. If the ball rolls over Switch #240, the SAME PLAYER SHOOT AGAIN lamp comes ON, giving the player an extra ball. A Free ball is played immediately after the ball on which it was one.

2.5 End Of Ball

When the ball returns to the OUT-HOLE KICKER, the bonus points are added to the player's score. In the case of one player, the BALL IN PLAY advances... the ball is returned to the SHOOTER ALLEY... and the score flashes.

In the case of two players, the ball does not advance. The second player's score flashes, indicating that it is time for the other player to play.

When the last player's last ball enters the OUT-HOLE KICKER, the player's LED goes OUT, and the GAME OVER lamp flashes END OF GAME. The GAME OVER lamp and score displays are the only lamps that are lit on the SCORE GLASS at this time.

2.6 Slam Switch/Tilt Mechanism

2.6

2.6.1 The SLAM SWITCH, which is located on the inside of the COIN DOOR, is designed to discourage unnecessary abuse to the game. SLAMMING THE MACHINE results in loss of game or games... the machine simply goes DEAD! A short delay occurs, after which the GAME OVER lamp flashes indicating the end of game or games whichever is being played.

The SLAM SWITCH is factory-adjusted to approximately 1/16" gap between contacts. Decreasing the gap will make the switch more sensitive. Opening the gap will reduce sensitivity. (See Illustration #2-C).

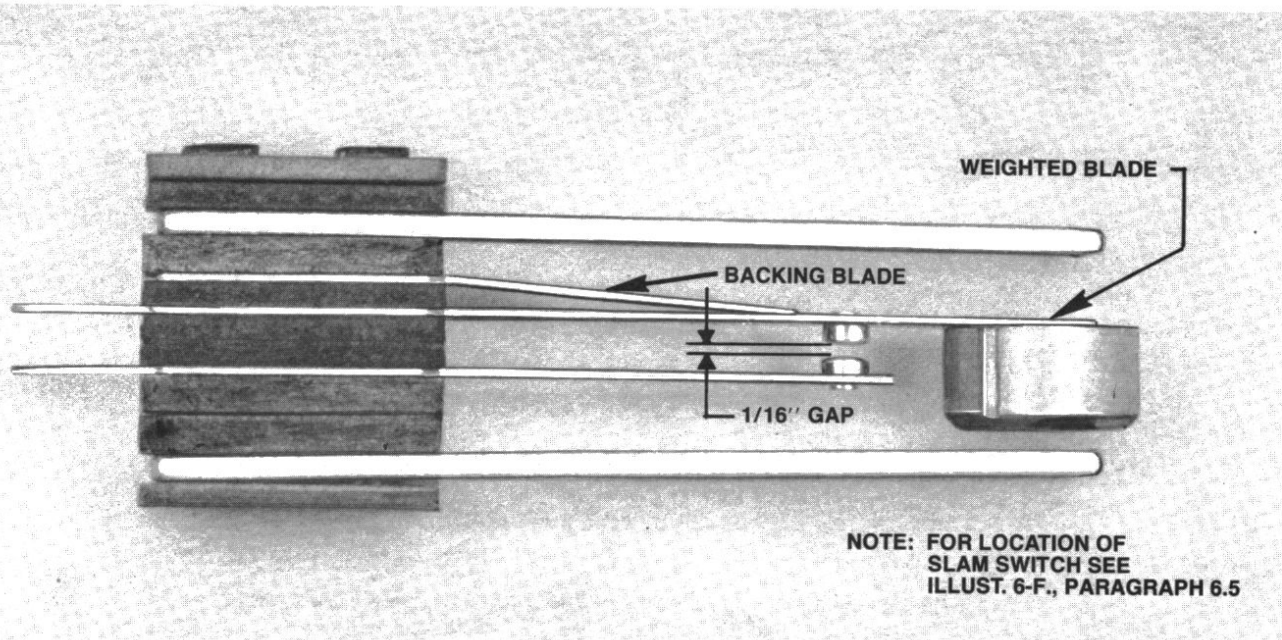
NOTE: Always adjust the WEIGHTED blade to attain the desired sensitivity.

2.6.2 The game is equipped with a TILT mechanism designed to discourage the player from jolting or lifting the machine in an attempt to prolong play (please see illustration #2-D). Tilting the game causes the flippers to go DEAD. The lamps on the RIGHT side of the REBOUND KICKER (close to the RIGHT flipper) and the LEFT 10-point switch (close to the LEFT flipper) all go OUT. The FLIPPER SWITCHES cannot be activated. The TILT lamp located on the SCORE GLASS assembly flashes.

NOTE: Adjustment instruction on illustration #2-D.

If one person is playing, the ball in play will advance. If two persons are playing, it will move to the next player. The OUT-HOLE KICKER propels the ball into the ALLEY, and the game returns to NORMAL. (The net effect of tilting the game is loss of a ball to the player who did the tilting.)

NOTE: Game will not tilt until ball rolls over BALL-IN-PLAY switch.

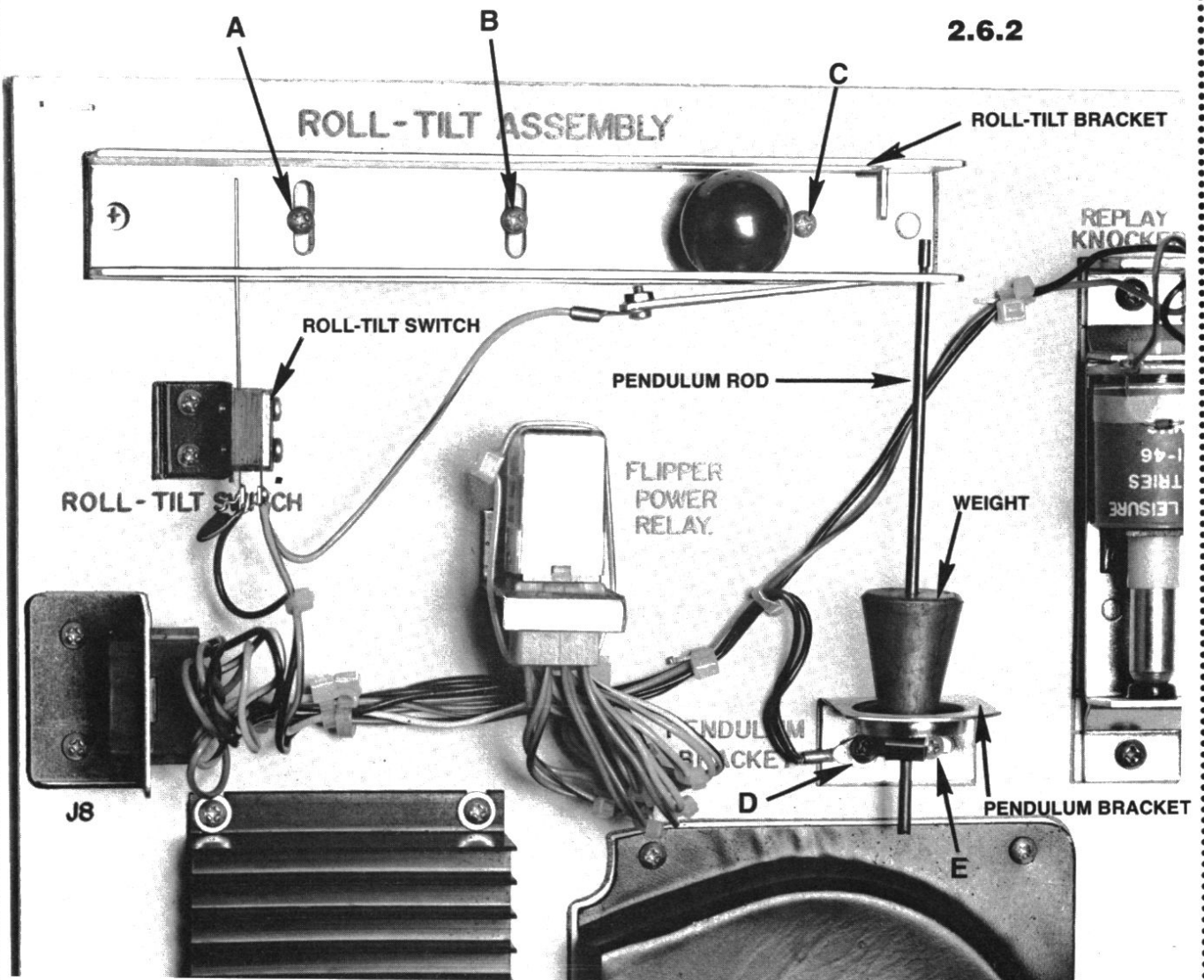


2-C

SLAM SWITCH

288-1-19

WARNING: You must touch System Ground before attempting adjustments



2-D

TILT MECHANISM ADJUSTMENTS

The TILT mechanism consists of one electrical circuit which can be activated by either of two mechanical assemblies:

The first assembly is called the ROLL-TILT and is activated when the front of the machine is lifted, allowing the ball shown in Illustration #2-D to roll down the bracket until it touches the ROLL-TILT switch. It can be adjusted by loosening screws "A", "B" and "C" and sliding the end of the bracket that is closer to the switch UP to decrease sensitivity, and DOWN to increase sensitivity.

The other TILT assembly is called the PENDULUM TILT, and is activated when the machine is jolted causing the weight to touch the pendulum bracket. Sensitivity can be decreased by sliding the weight and the clip UPWARD on the pendulum rod... similarly sensitivity can be increased by sliding the weight and the clip DOWNWARD on the pendulum rod.

Be sure that the pendulum rod and the pendulum weight are ALWAYS centered. If necessary, adjust the pendulum bracket by loosening screws "D" and "E" (Illustration #2-D), and then adjust accordingly.

3.0 GAME ADJUSTMENTS AND OPTIONS

3.0

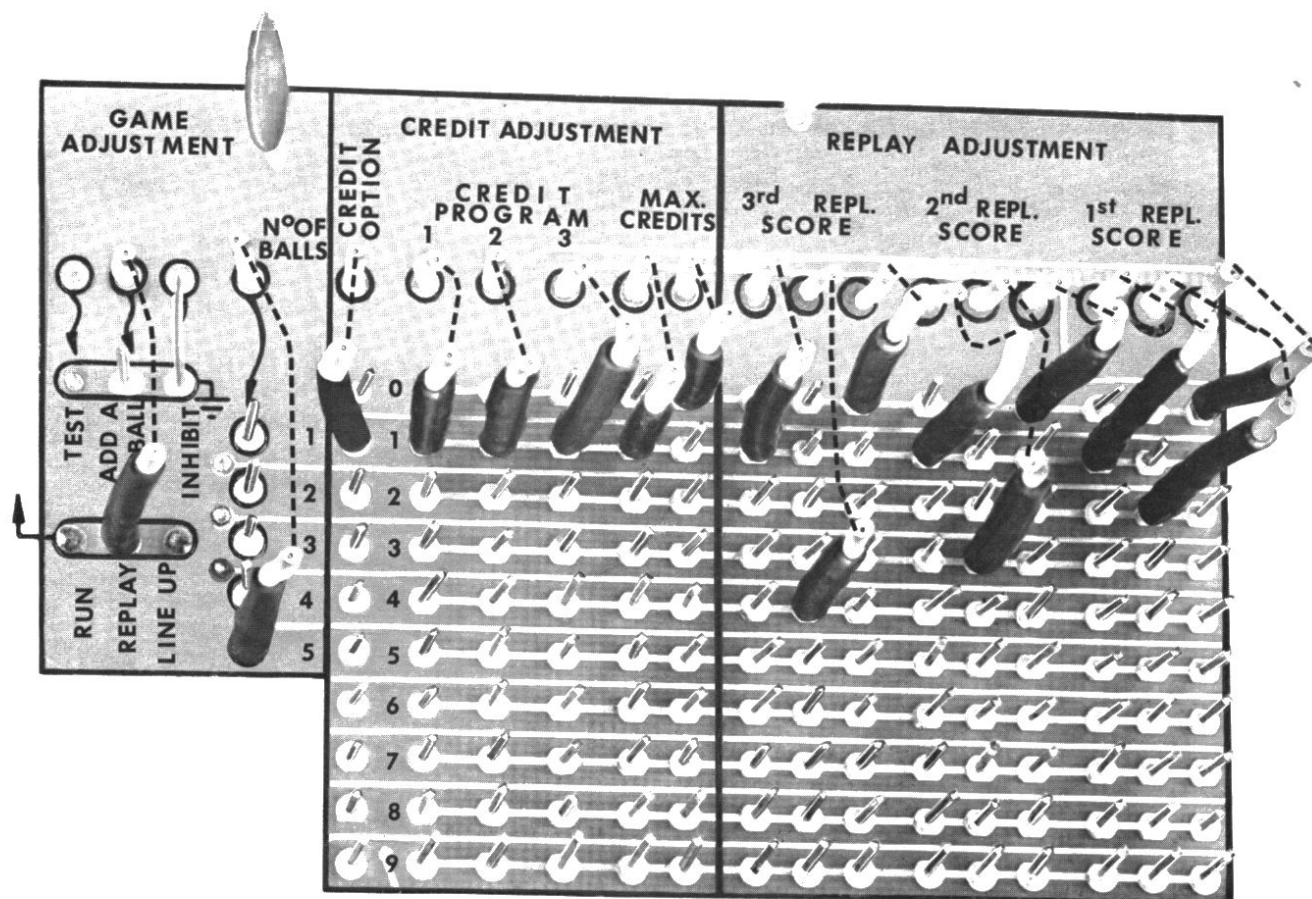
3.1 Standard Factory Adjustments

Several game adjustments and options are performed by moving jumpers on the MAIN COMPUTER BOARD (see next page: illustration #3-A). These jumpers determine cost and number of balls per game.

IMPORTANT: Jumpers should never be handled by the wires... **INSTEAD** they should be held by the plastic housings and pulled gently from the pin.

- (1) Run Test—No Jumper
- (2) Replay/Add-A-Ball—Lower Pin
- (3) Line-up Inhibit—No Jumper or Inhibit
- (4) Number of Balls—5
- (5) Credit Option—1
- (6) Credit Program 1—1
- (7) Credit Program 2—1
- (8) Credit Program 3—1
- (9) Max Credits Tens—1
- (10) Max Credits Units—0
- (11) 3rd Replay Score 100,000—1
- (12) 3rd Replay Score 10,000—4
- (13) 3rd Replay Score 1,000—0
- (14) 2nd Replay Score 100,000—1
- (15) 2nd Replay Score 10,000—3
- (16) 2nd Replay Score 1,000—1
- (17) 1st Replay Score 100,000—1
- (18) 1st Replay Score 10,000—2
- (19) 1st Replay Score 1,000—0

3-A



MAIN COMPUTER ADJUSTMENT

3.2.1 Replay/Add-A-Ball Selective

Prior to removing the MAIN COMPUTER BOARD for game adjustments and options, power to the game MUST BE DISCONNECTED!

Refer to illustration #3-A, and adjust accordingly.

There is a jumper on the MAIN COMPUTER BOARD for winning "Replay" or "Add-A-Ball."

This option is programmed on the MAIN COMPUTER BOARD by placing the jumper on the proper pin as indicated on the computer board. This jumper determines whether a SCORE REPLAY or SPECIAL gives an extra ball or a free game.

Example 1—With jumper on lower pin labelled REPLAY, and with sufficient score, or by hitting SPECIAL WHEN LIT bull's-eye target while the lamp is lighted, player can win free games.

Example 2—With jumper on upper pin labelled ADD-A-BALL, no free games can be won. However, when player hits SPECIAL WHEN LIT bull's-eye target while the lamp is lighted, or with sufficient scores, extra balls can be won.

Example 3—If no extra balls are to be awarded on sufficient scores, put ADD-A-BALL jumper on upper pin, and put all 9 jumpers on 0's on REPLAY adjustments which automatically eliminates winning free games.

LINE-UP INHIBIT: This feature not included in routine games.

NUMBER OF BALLS ADJUSTMENT: This jumper determines the number of balls played per game. 1 to 5 balls can be selected by moving jumper to correspondingly numbered pin.

3.2.2 Credit Options & Credit Programs

There are several credit options which determine the number of credits given by various combinations of the COIN SWITCH. Please note that the top pin of each row is a "0." The options function as follows:

- (1) Credit Option "0"—This is not used.
- (2) Credit option "1"—In this mode, one activation of the coin switch will give the number of credits as per Credit Program 3. Credit Programs 1 and 2 are NOT used... ignore these jumpers.

Example 1—With credit option on pin 1 and credit program 3 on pin 1, the coin-activating switch will give 1 game.

Example 2—With credit option on pin 1 and credit program 3 on pin 2, the coin-activating switch will give 2 games, etc.

- (3) Ignore all other credit option pins for cocktail table games.

3.2.2

MAXIMUM CREDITS: These jumpers determine the maximum number of games that can be stored in the credit section. There is a "tens" program jumper and a "units" program jumper. It should be noted that the top of each column starts with a "0" pin.

Example 1: If the left jumper is on left row pin 1, and right jumper is on right row pin 0, then the credit section can store a maximum of ten (10) free or paid games, or combination thereof.

Example 2: If the left jumper is on left row pin 0, and right jumper is on right row pin 5, then the credit section can store a maximum of five (5) free or paid games, or combination thereof.

3.2.3 Replay Adjustment

There are three programmable winning score values. Each value has 100,000...10,000...and 1,000-point settings. It should be noted that the top pin in each column is a "0".

Example: If a value of 76,000 was desired as one of the replays, the 100,000 jumper would be on pin 0... the 10,000 jumper would be on pin 7...and the 1,000 jumper would be on pin 6.

NOTE: Scores should be lower for 3-ball games.

The 2nd replay score must be set higher than the 1st, and the 3rd replay score must be set higher than the 2nd. Differences of scores should be at least 10,000 in accordance with the above example, and may be even higher, depending on abilities of players to win free games. **ONLY THREE (3) FREE GAMES** can be won with sufficient scores.

NOTE: Where free games are allowed, the rule of thumb is 20% free games to encourage more play.

Therefore, if the game counter indicates that 500 games have been played since the last collection of coins, and there are approximately 400 coins in cash box, the players are winning approximately 20% of total games played.

If there are too many or too few free games based on this count, adjust the REPLAY ADJUSTMENT jumpers accordingly.

An **OPTIONAL REPLAY COUNTER** is available with complete installation procedure.

4.0 PLAYFIELD OPERATIONAL AND PARTS REMOVAL PROCEDURES

4.0

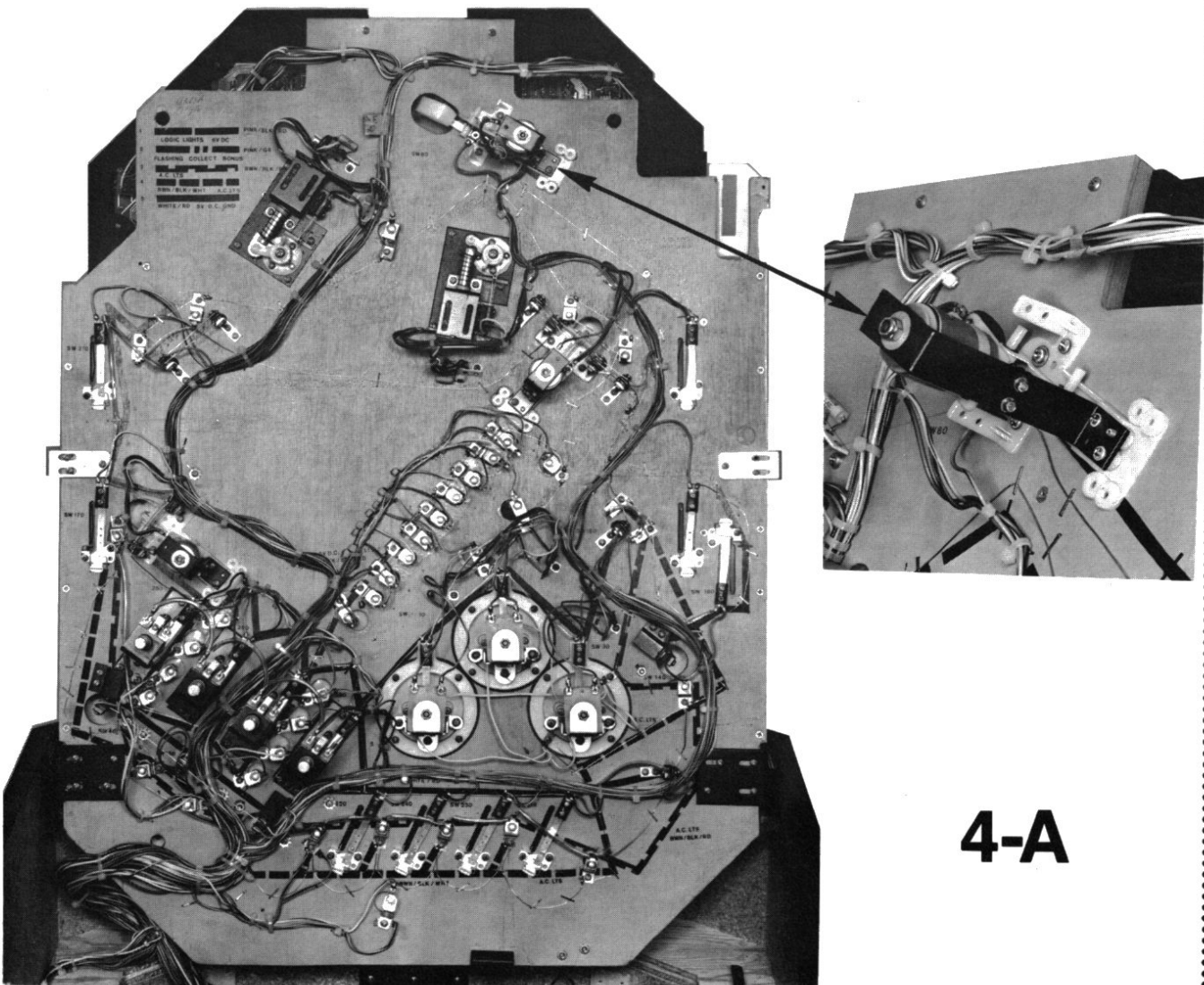
4.1 How To Remove An Assembly (refer to illustration #4-A)

To remove an assembly from the PLAYFIELD (except the thumper bumper and flipper assemblies as referred to respectively in paragraphs 4.2 and 4.3) proceed as follows:

- (1) Remove the screws that mount the assembly to the bottom of the playfield.
- (2) Carefully unsolder all connecting wires.
- (3) Then gradually remove the assembly.

NOTE #1: If the assembly is being replaced, the wires should be unsoldered and transferred one-by-one to insure connection of the proper points.

NOTE #2: It is absolutely necessary that the screws and wires are replaced in the exact location from which they were removed.



4-A

WARNING: You must touch System Ground before attempting adjustments

ILLUSTRATION “#4-A” DESCRIPTION OF SOME PARTS BELOW PLAYFIELD

LOCATION	PART NUMBER	DESCRIPTION
1	235-8-3	Roll-Over Spring
2	235-3-9	Roll-Over Bracket
3	292-1-37	Diode and Cap Assembly
4	50190008	Lamp Socket (long)
5	264-1-159	2-lug Terminal Strip and Diode
6	264-3-40	Playfield Bracket
7	307-1-19	Playfield Hinge
8	5019006	Lamp Socket (short)

4.2 Thumper Bumper

The THUMPER BUMPER is probably more responsible for generating ball action than any other item on the PLAYFIELD, and it necessarily must function properly at all times.

OPERATION:

When the ball hits the THUMPER BUMPER wafer, the wafer pushes the activator rod downward, closing the switch. When the switch is closed, the COIL energizes and pulls the THUMPER BUMPER KICKER downward, pushing the ball in the opposite direction.

This assembly should be adjusted so that the switch closes when the wafer is half-way between the HOME position and the surface of the PLAYFIELD. If the switch closes before the wafer gets to the half-way point, the COIL is energized before the ball is close enough to the inside . . . as a result, it is not propelled with sufficient force.

If the switch is adjusted so that it closes after the half-way point, a ball travelling at a fast pace can sometimes go all the way IN and back OUT without being recognized by the switch, resulting in a dead (inactive) THUMPER BUMPER.

Another important aspect of the switch adjustment is the tension on the upper blade. Too much tension will cause the wafer to resist the ball, and too little tension will cause the wafer to be pushed down too easily.

We suggest that the switch be cleaned and adjusted only when necessary. Adjustments should be done as explained in paragraph 8.5.

4.2.1 Changing The Bulb

To change the light bulb, remove the two (2) screws at the top of the THUMPER BUMPER cap and replace the bulb. Make sure that the socket is firm.

It may be necessary to adjust the socket with pliers or similar tool.

4.2.2 Removal From Playfield

4.2.2

Should it become necessary to change a major part on the THUMPER BUMPER, the entire assembly should be removed from the game in the following manner:

- (1) Remove the cover (sunflower cap).
- (2) Remove the four (4) screws that mount the base to the PLAYFIELD.
- (3) Unsolder the following wires:
 - (a) 2 wires connected to the switch.
 - (b) 2 light-bulb socket wires.
 - (c) Coil wires.

The assembly can be dis-assembled as shown in illustration #4-B.

DESCRIPTION OF PARTS IN THUMPER BUMPER ASSEMBLY

(Illustration #4-B)

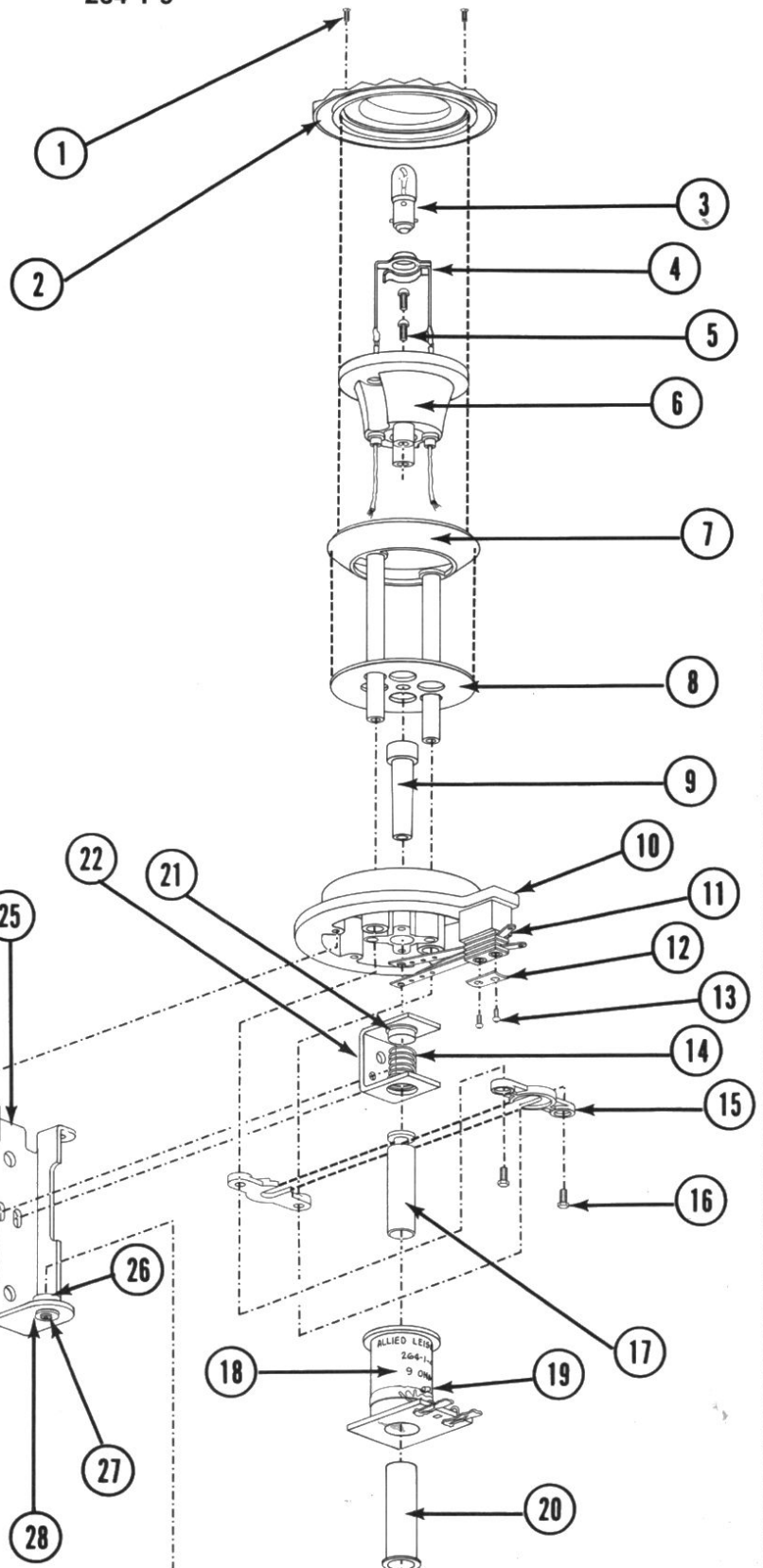
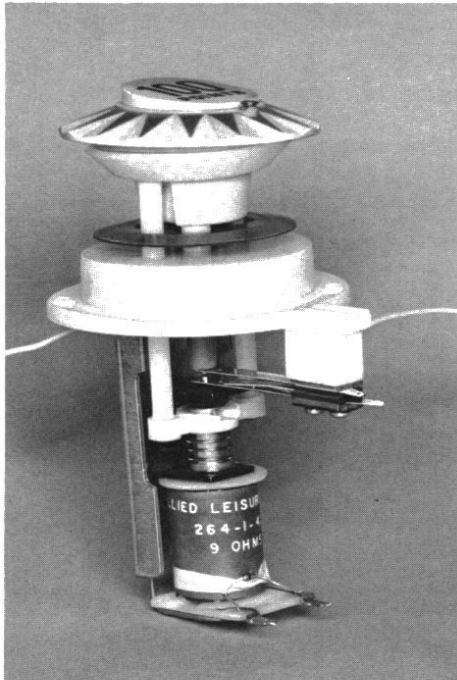
LOCATION	PART NUMBER	DESCRIPTION
1	10040003	No. 4 x 3/8" Phillips RD/SMS
2	264-6-32	Sunflower cap red 100 pts Thumper Bumper
3	50180004	Lamp #44
4	50190015	Light socket
5	10050014	No. 6-32 x 3/4" Phillips self-tap screw "T"
6	264-8-22	Thumper bumper base
7	264-5-30	Thumper bumper kicker
8	288-5-2	Thumper bumper wafer
9	288-5-1	Rod push actuator
10	264-5-24	Thumper bumper base
11	288-70-10	Switch assembly
12	235-73-58	Switch tension plate
13	10050017	No. 4-40 x 5/8" Phillips P.H.M.S.
14	235-8-7	Spring "T" bumper
15	264-5-27	Thumper bumper kicker link
16	10050011	No. 6-32 x 1/2" Phillips P.H.M.S. self-tap "T" point
17	235-2-16	Solenoid plunger Type "B"
18	264-1-46	Coil
19	50100010	2-amp diode
20	235-8-214	Coil sleeve
21	235-8-68	Rubber pad
22	235-3-31	Thumper bumper stop
23	10050011	No. 6-32 x 1/2" Phillips P.H.M.S.
24	10020001	No. 6-32 x 1/4" Whiz lock M.S.
25	264-3-59	Thumper bumper bracket
26	307-2-9	Solenoid stop
27	10220029	140 x .531 oval hd brass tub
28	10190043	#6 flat washer

WARNING: You must touch System Ground before attempting adjustments

THUMPER BUMPER ASSEMBLY

4.2.2

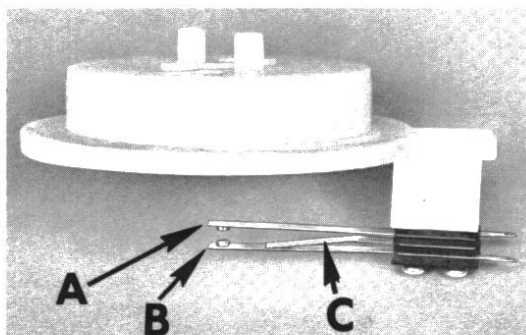
264-1-9



THUMPER BUMPER SWITCH ADJUSTMENT

Blades "A" and "C" must have no bends. Blade "B" is pre-bent to allow a 1/32" gap between Blades "A" and "C" while in its normally OPEN position.

Any adjustment necessary must be done ONLY to Blade "B".



4-B

WARNING: You must touch System Ground before attempting adjustments

4.3 Flipper

4.3

The FLIPPERS are used to manipulate the ball in the PLAYFIELD area, (illustration 4-C). Since they are used many times in a single game, it is vital that they function properly.

Clean well-adjusted switches are a **MUST!** Adjustment procedures are detailed in paragraph 8.5 (illustration 8-E and 8-F.)

HOW TO REPLACE THE FLIPPER ASSEMBLY:

- (1) Remove the 5 screws that mount the assembly to the playfield.
- (2) Remove the 2 screws from the plastic bushing.
- (3) Remove the large screw from the center of the flipper bushing.
- (4) Remove the portion of the assembly that is below the playfield ... then remove the arm from the top surface.
- (5) Install the new assembly (using above instructions 1 through 4 in reverse order).
- (6) Unsolder and transfer the following wires:
 - (a) 2 wires from the switch assembly.
 - (b) 3 wires from the flipper coil.

CAUTION: Be sure that the new arm is inserted into the bushing at the proper angle before tightening the screw.

DESCRIPTION OF PARTS IN FLIPPER ASSEMBLY

(Illustration #4-C)

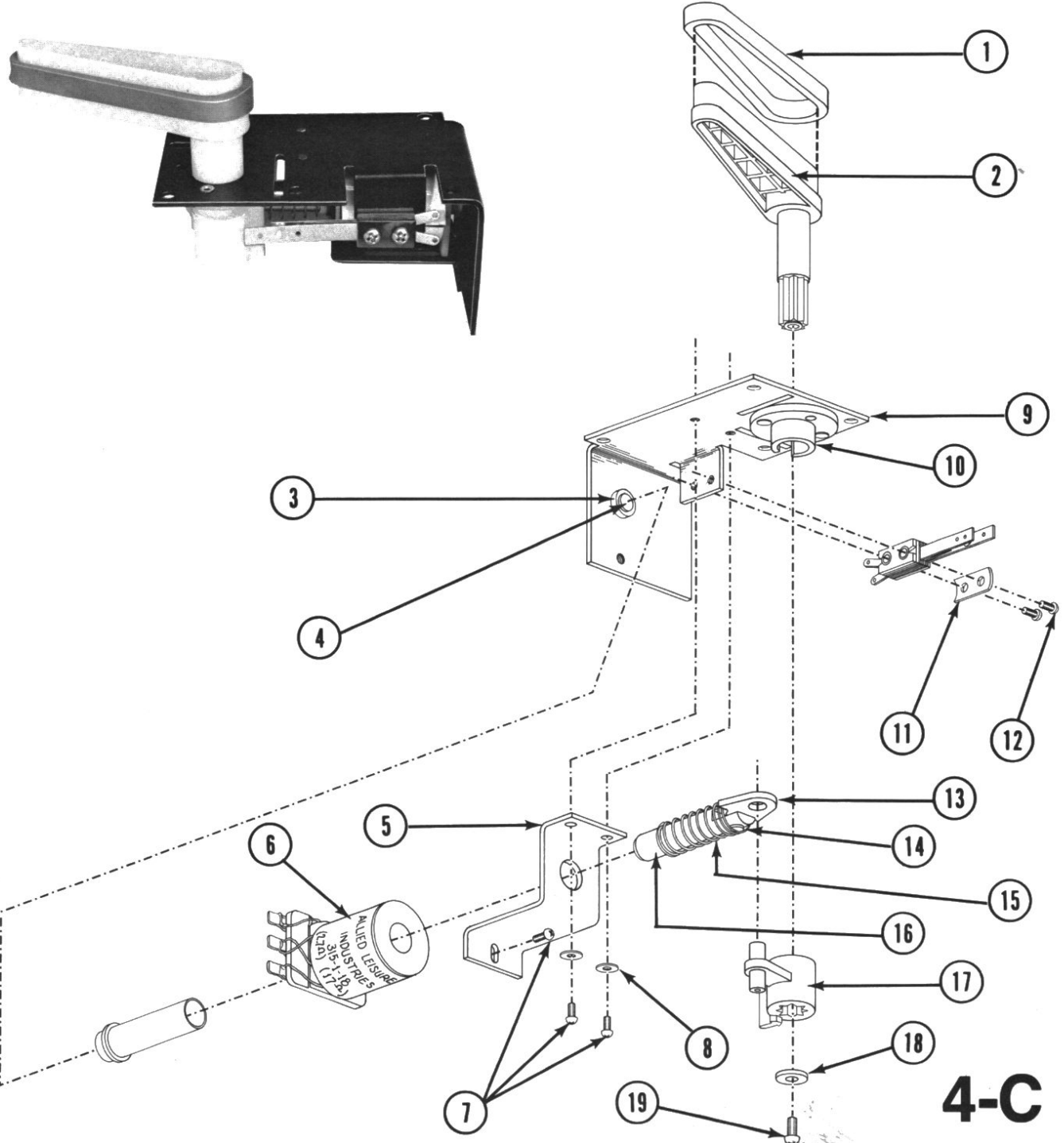
LOCATION	PART NUMBER	DESCRIPTION
1	264-8-45	Red flat rubber ring
2	264-5-76	Flipper arm
3	264-2-28	Solenoid stop
4	10220022	Brass brake lining rivet
5	264-3-140	Solenoid bracket sleeve layout
6	315-1-18	2.7-ohm coil
7	10010102	No. 6-32 x 3/16" Phillips P.H.M.S.
8	10190043	#6 flat washer nickel plate
9	264-3-132	Base plate flipper LH—RH
10	264-5-31	Flipper bushing
11	235-73-58	Switch tension plate
12	10010087	No. 5-40 x 1/2" Phillips P.H.M.S.
13	264-3-106	Offset link
14	10260001	Eyelet .123 x 1/2"
15	235-8-8	Plunger spring Type "A"
16	264-2-27	Solenoid plunger Type "E"
17	264-5-25	Flipper actuating cam
18	10190045	3/16" ID 1/2" OD 1/16" thick
19	10050032	No. 10-32 x 3/8" Phillips P.H.M.S. "T" point

WARNING: You must touch System Ground before attempting adjustments

FLIPPER ASSEMBLY

264-1-7

4.3



4-C

LEFT FLIPPER		
COIL PIN	WIRE COLOR	QUANT.
INSIDE	Brn/Blk/Yellow	2
MIDDLE	White/Brown	1
END	Violet/Black	1
Sw Conn "A"	Brn/Blk/Yellow	1
Sw Conn "B"	White/Brown	1

RIGHT FLIPPER		
COIL PIN	WIRE COLOR	QUANT.
INSIDE	Violet/Blk/Brn	2
MIDDLE	White	2
END	Brown/Black	2
Sw Conn "A"	Brown/Black	1
Sw Conn "B"	White	1

NOTE: Inside pin is the one closest to the Playfield. Switch Connections "A" and "B" are interchangeable.

WARNING: You must touch System Ground before attempting adjustments

4.4 OUT-HOLE KICKER

4.4

When the ball rolls into the OUT-HOLE, it closes the kicker switch. The computer recognizing the switch closure adds the BONUS points to the Player's score. The coil energizes, pulling the ARM downward and tossing the ball into the SHOOTER ALLEY. The switch adjustment is very critical on this assembly.

When the gap on the contacts is too narrow, they may close rapidly several times in a machine-gun type of sound. This action would prevent the coil from achieving full stroke. As a result, the arm is not pulled with sufficient force to toss the ball all the way to the SHOOTER ALLEY.

When the gap on the contacts is too wide, the switch does not close when the ball returns to the hole. As a result, the game does not recognize the end of the BALL IN PLAY, and does not kick the ball into the SHOOTER ALLEY.

In either situation, adjust the switch as outlined in paragraph 8.5. For clarification, please see illustration #4-D.

DESCRIPTION OF PARTS IN OUT-HOLE KICKER ASSEMBLY (Illustration #4-D)

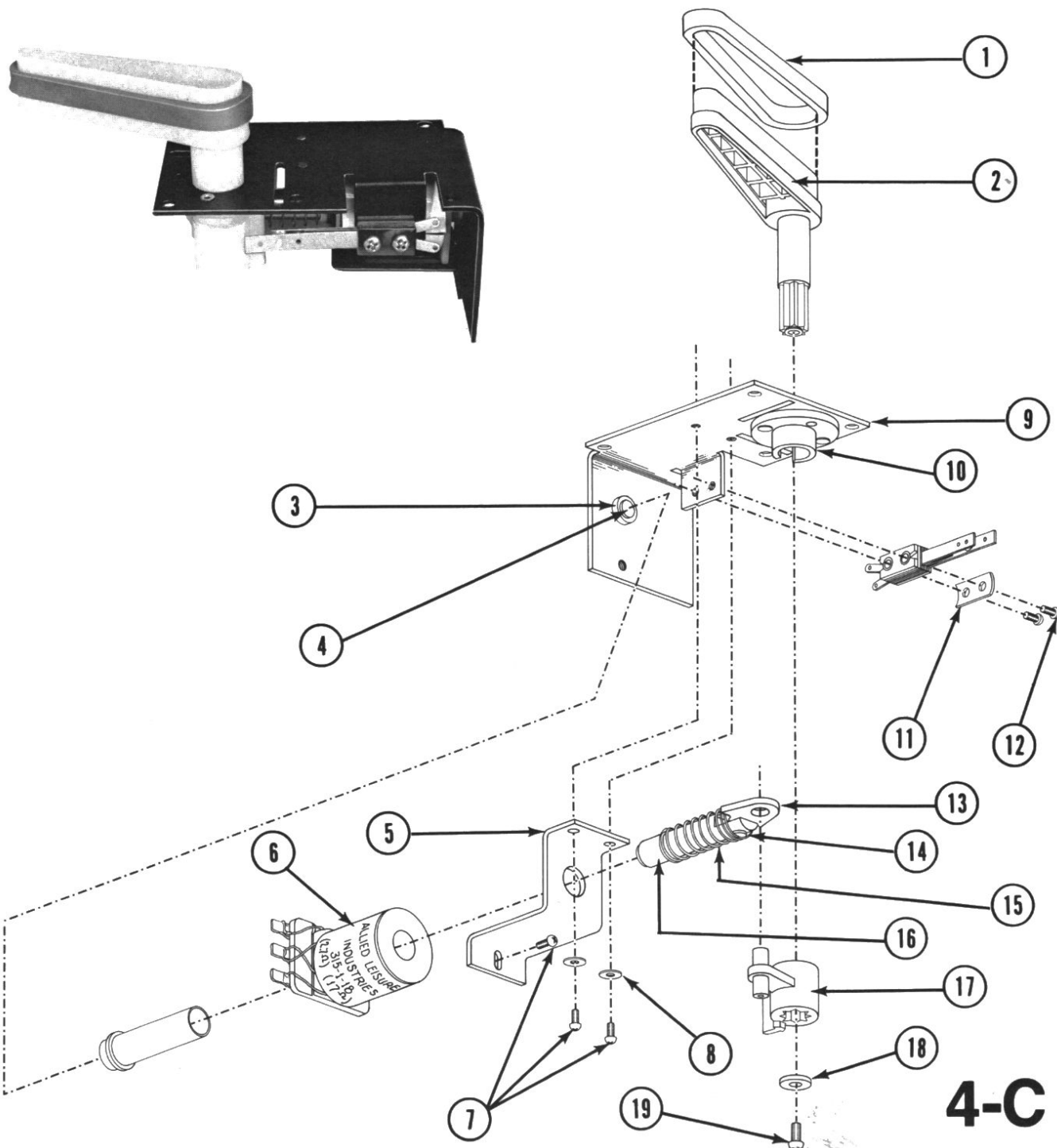
LOCATION	PART NUMBER	DESCRIPTION
1	264-5-40	Ball kicker pin
2	264-1-180	Solenoid bracket
3	10020001	No. 6-32 x 1/4" M.S. Whiz lock
4	288-3-5	Washer aluminum coil shim
5	264-5-40	Ball kicker pin
6	264-3-53	Solenoid bracket #2
7	100260001	Eyelet
8	10010066	No. 6-32 x 1/2" Phillips F.H.M.S.
9	10010107	No. 5-40 x 3/4" Phillips F.H.M.S.
10	264-5-37	Ball kicker base
11	10270002	"E" ring #5133-18
12	264-71-66	Ball kicker switch assembly
13	235-73-58	Switch tension plate
14	10270002	"E" ring #5133-18
15	264-5-39	Ball kicker arm
16	264-5-46	Offset link
17	235-8-8	Plunger spring Type "A"
18	235-2-21	Solenoid plunger Type "D"
19	10100010	2-amp diode
20	264-1-102	11-ohm coil
21	235-8-214	Coil sleeve Type "A"

WARNING: You must touch System Ground before attempting adjustments

FLIPPER ASSEMBLY

264-1-7

4.3



4-C

LEFT FLIPPER		
COIL PIN	WIRE COLOR	QUANT.
INSIDE	Brn/Blk/Yellow	2
MIDDLE	White/Brown	1
END	Violet/Black	1
Sw Conn "A"	Brn/Blk/Yellow	1
Sw Conn "B"	White/Brown	1

RIGHT FLIPPER		
COIL PIN	WIRE COLOR	QUANT.
INSIDE	Violet/Blk/Brn	2
MIDDLE	White	2
END	Brown/Black	2
Sw Conn "A"	Brown/Black	1
Sw Conn "B"	White	1

NOTE: Inside pin is the one closest to the Playfield. Switch Connections "A" and "B" are interchangeable.

WARNING: You must touch System Ground before attempting adjustments

4.4 OUT-HOLE KICKER

4.4

When the ball rolls into the OUT-HOLE, it closes the kicker switch. The computer recognizing the switch closure adds the BONUS points to the Player's score. The coil energizes, pulling the ARM downward and tossing the ball into the SHOOTER ALLEY. The switch adjustment is very critical on this assembly.

When the gap on the contacts is too narrow, they may close rapidly several times in a machine-gun type of sound. This action would prevent the coil from achieving full stroke. As a result, the arm is not pulled with sufficient force to toss the ball all the way to the SHOOTER ALLEY.

When the gap on the contacts is too wide, the switch does not close when the ball returns to the hole. As a result, the game does not recognize the end of the BALL IN PLAY, and does not kick the ball into the SHOOTER ALLEY.

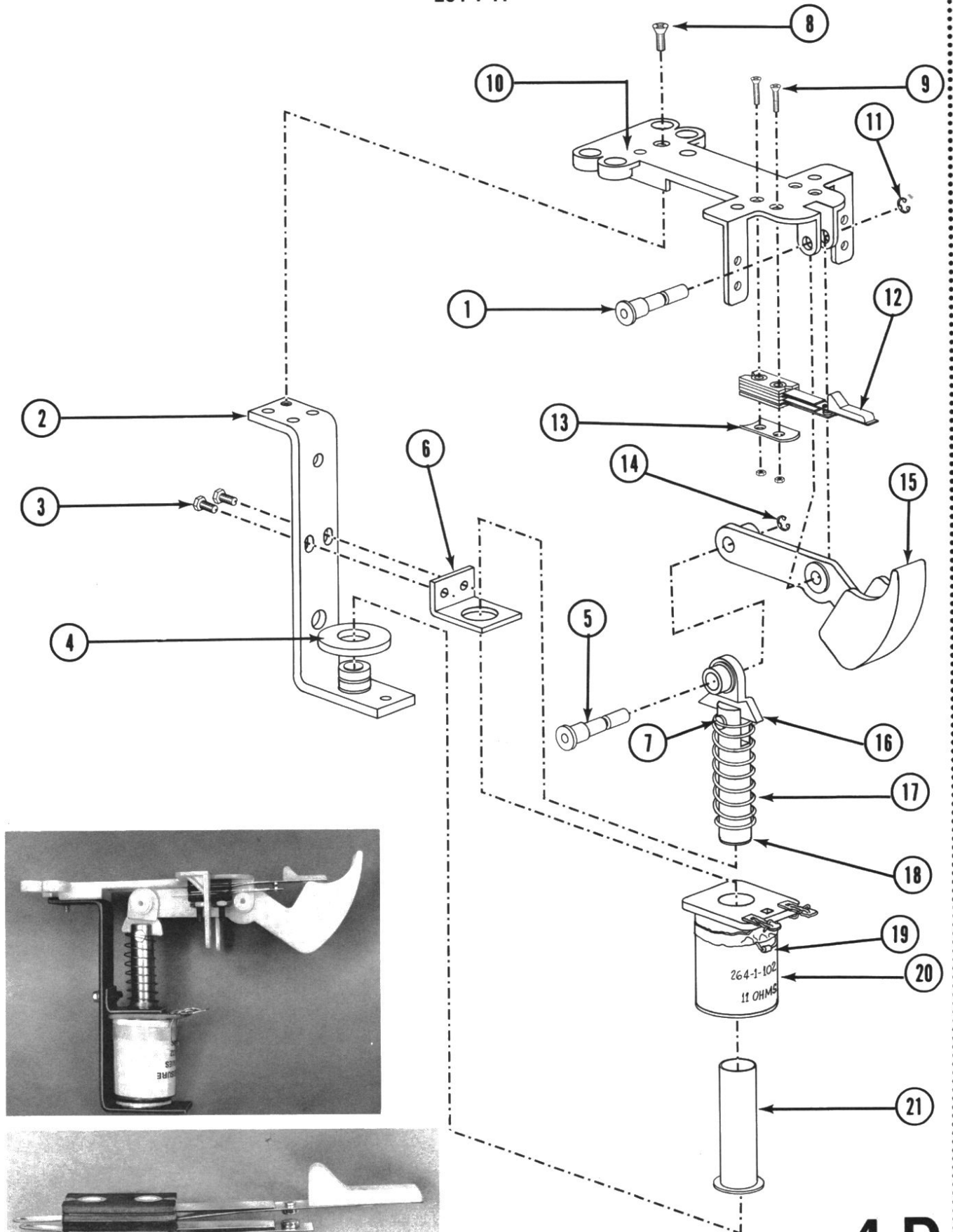
In either situation, adjust the switch as outlined in paragraph 8.5. For clarification, please see illustration #4-D.

DESCRIPTION OF PARTS IN OUT-HOLE KICKER ASSEMBLY (Illustration #4-D)

LOCATION	PART NUMBER	DESCRIPTION
1	264-5-40	Ball kicker pin
2	264-1-180	Solenoid bracket
3	10020001	No. 6-32 x 1/4" M.S. Whiz lock
4	288-3-5	Washer aluminum coil shim
5	264-5-40	Ball kicker pin
6	264-3-53	Solenoid bracket #2
7	100260001	Eyelet
8	10010066	No. 6-32 x 1/2" Phillips F.H.M.S.
9	10010107	No. 5-40 x 3/4" Phillips F.H.M.S.
10	264-5-37	Ball kicker base
11	10270002	"E" ring #5133-18
12	264-71-66	Ball kicker switch assembly
13	235-73-58	Switch tension plate
14	10270002	"E" ring #5133-18
15	264-5-39	Ball kicker arm
16	264-5-46	Offset link
17	235-8-8	Plunger spring Type "A"
18	235-2-21	Solenoid plunger Type "D"
19	10100010	2-amp diode
20	264-1-102	11-ohm coil
21	235-8-214	Coil sleeve Type "A"

264-1-11

4.4



4-D

WARNING: You must touch System Ground before attempting adjustments

4.5 Bull's-Eye Target

4.5

The BULL'S-EYE TARGET is assembled in the same manner as are the other switches except that one blade has a target attached. The switch should be adjusted as described in paragraph 8.5.

If and when it is necessary to remove the assembly, first remove the brace bracket ... then remove the two (2) mounting screws, unsolder the wires, and remove the assembly. (Please see illustration #4-E.)

4.6 Roll-Over Switch

The most important maintenance features about the ROLL-OVER SWITCH are as follows (see illustration #4-F):

- (1) Adjustment ... as outlined in paragraph 8.5.
- (2) Proper tension on the spring (portion above the playfield surface). The tension should be adjusted so that it is not so stiff as to interrupt the travel of the ball.

Also it must not be too soft because then the ball pushes it sideways rather than straight DOWN.

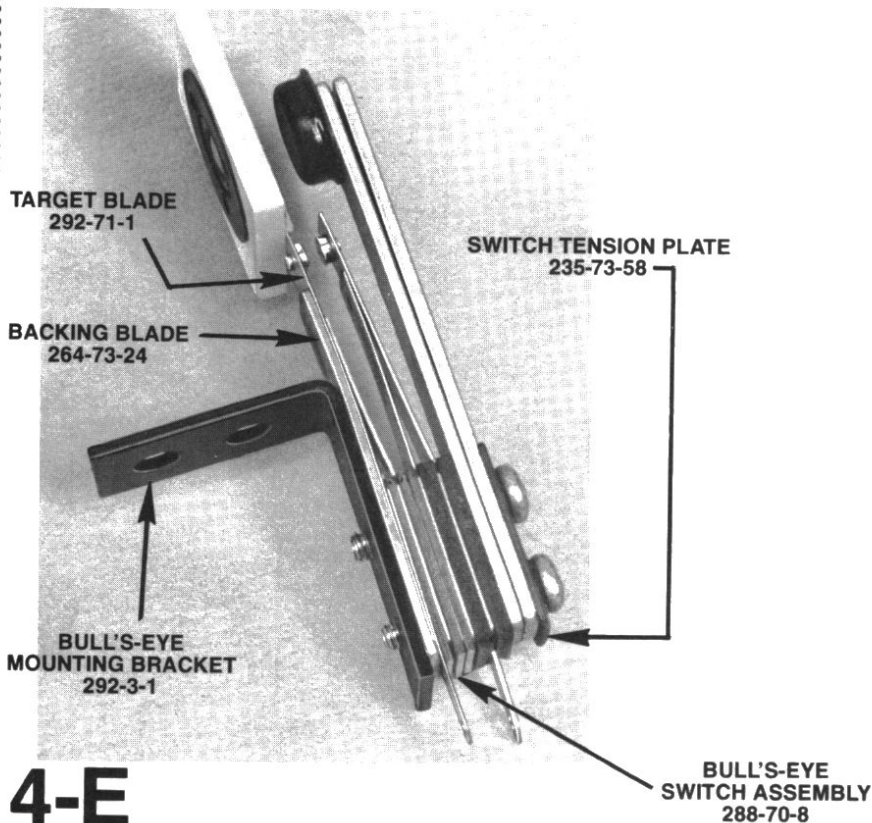
- (3) To remove a ROLL-OVER SWITCH, just unscrew the mounting screws and unsolder the wires

BULL'S-EYE TARGET

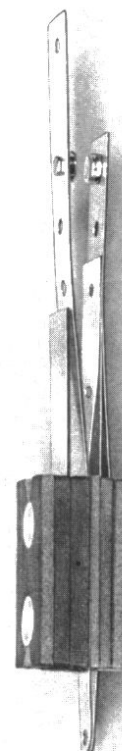
292-1-10

ROLL-OVER SWITCH

288-70-2



4-E



4-F

WARNING: You must touch System Ground before attempting adjustments

4.7 Rebound Kicker (or Sling Shot)

4.7

This game is equipped with one or more REBOUND KICKERS designed to generate ball speed (see illustration #4-G).

The switches of these assemblies should be adjusted so that the rubber touches the blade while maintaining a gap of 1/16" as outlined in paragraph 8.5.

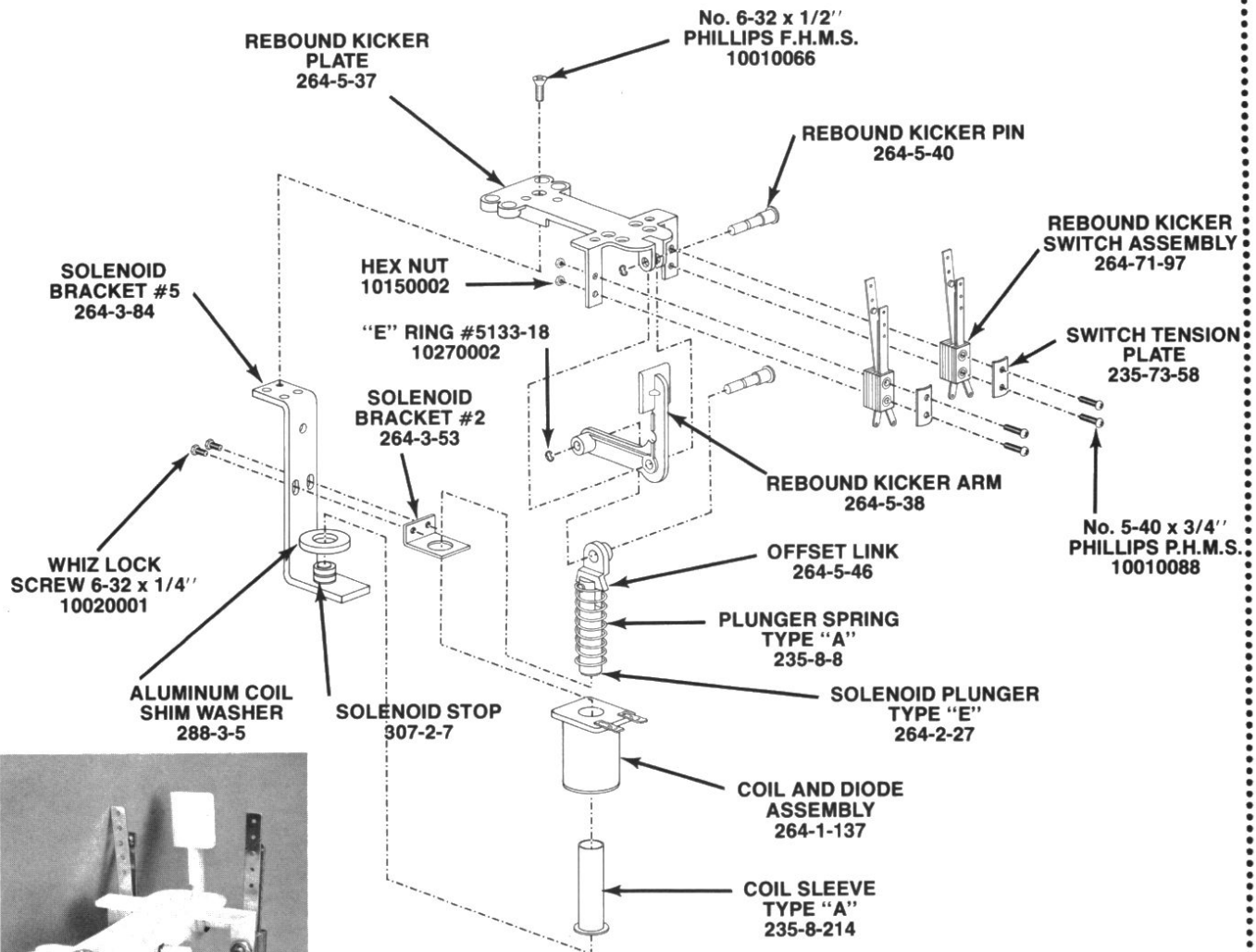
After switch adjustment, please refer to paragraph 7.3.3 (Self-Diagnostic TEST MODE THREE) to verify proper switch adjustment.

DESCRIPTION OF PARTS IN REBOUND KICKER ASSEMBLY

(Illustration #4-G)

REBOUND KICKER (or SLING SHOT)

264-1-10



4-G

WARNING: You must touch System Ground before attempting adjustments

4.8 Drop Target

4.8

The DROP TARGET (see illustration #4-H), like the THUMPER BUMPER, is an electro-mechanical assembly.

The movement from the top of the playfield surface is strictly mechanical. However, on the way down, the edge of the paddle catches the switch, closing it and causing the game to score.

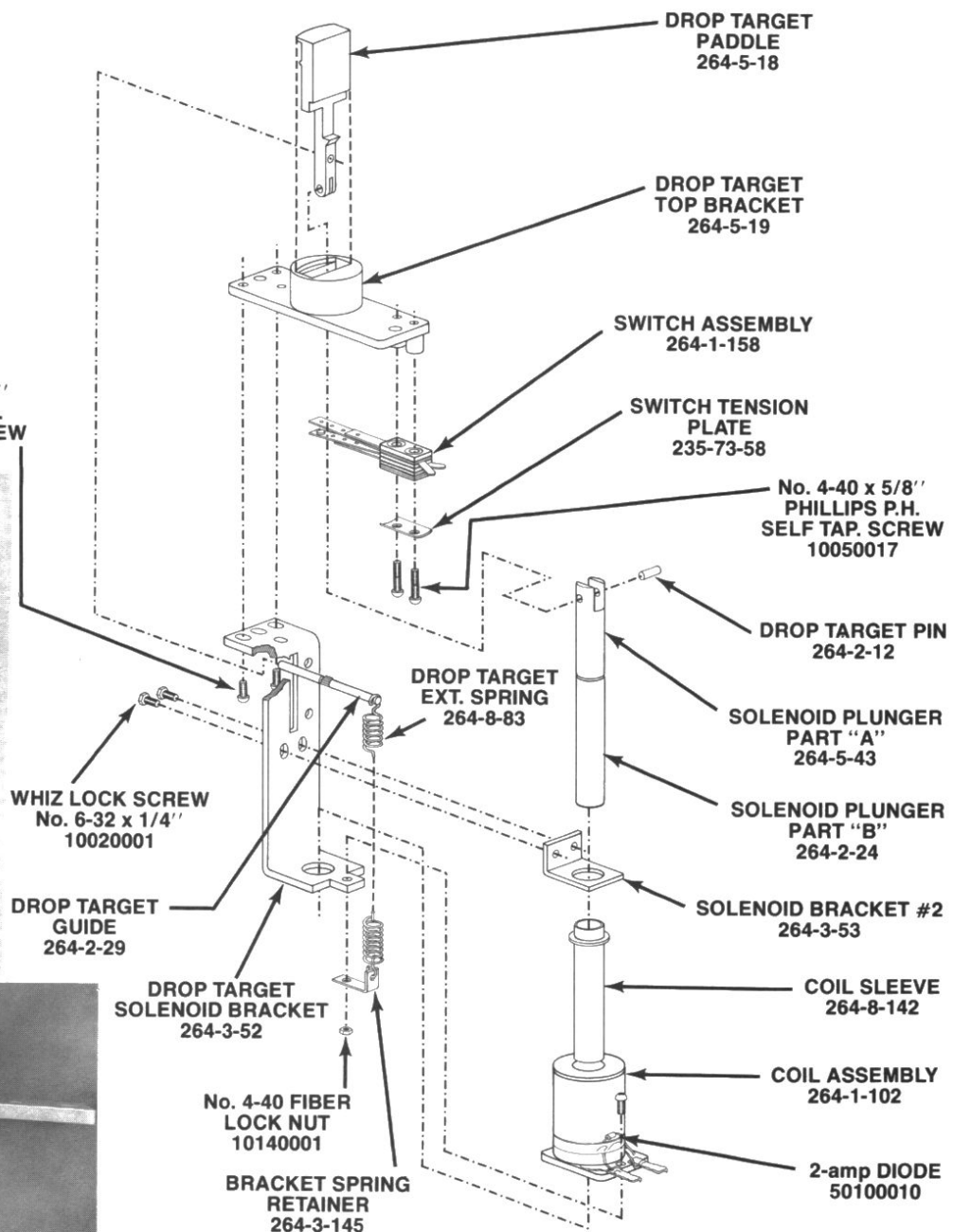
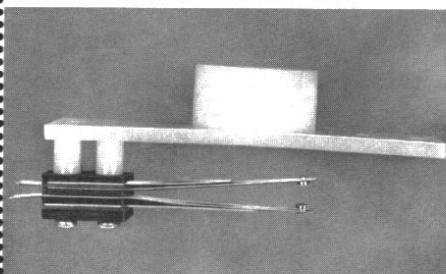
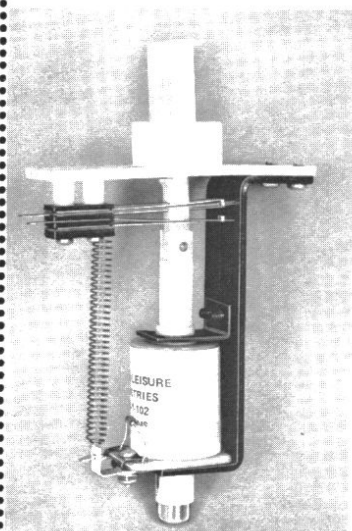
When the ball rolls over a RAISE DROP TARGET switch, the computer recognizes the switch closure and energizes the respective coil, pushing the plunger and paddle upward until it is locked in position at the top of the Playfield.

DESCRIPTION OF PARTS IN DROP TARGET ASSEMBLY (Illustration #4-H)

DROP TARGET ASSEMBLY 264-1-36

4-H

No. 6-32 x 1/4''
PHILLIPS P.H.
SELF TAP. SCREW
10050009



WARNING: You must touch System Ground before attempting adjustments

4.9 Shadow Box

4.9

The SHADOW BOX is the assembly at the front of the playfield on which the SCORE GLASS is mounted (see illustration #4-1). This assembly contains the following:

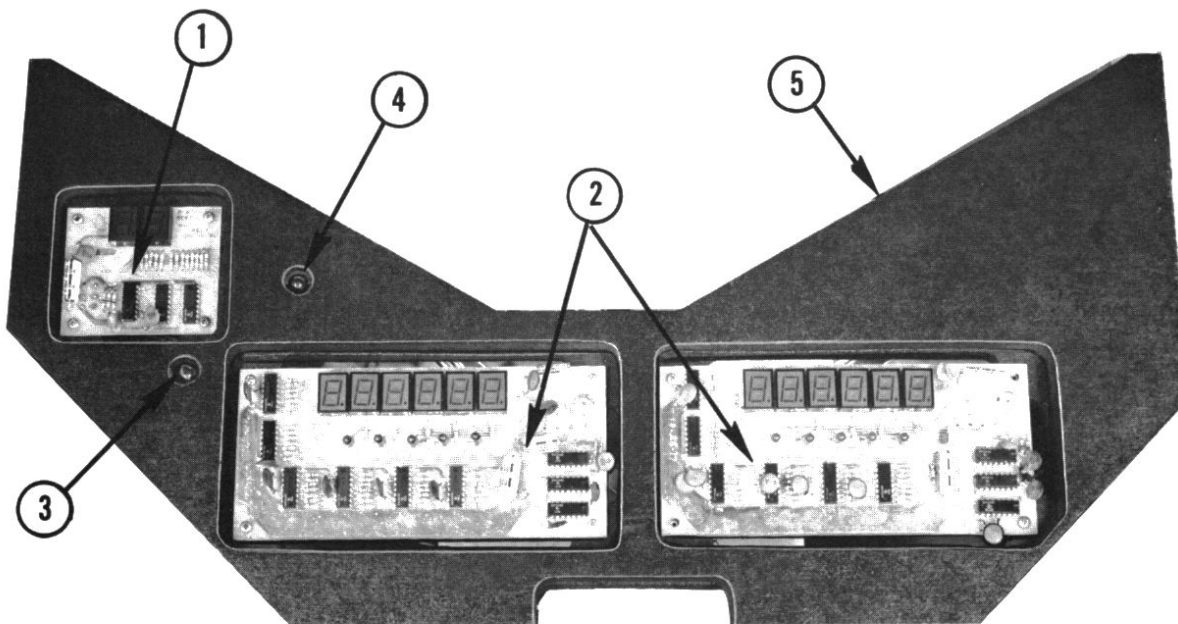
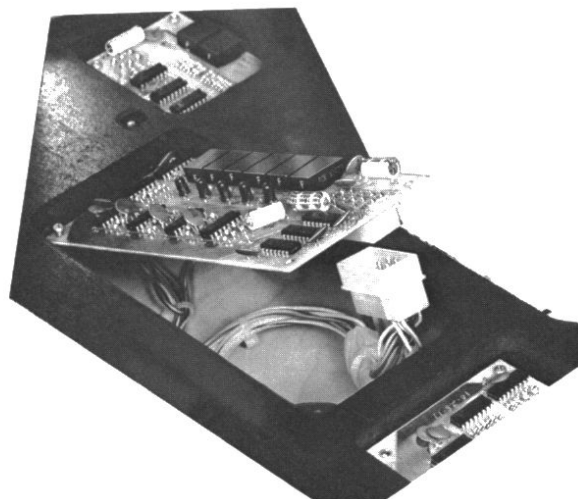
- (1) Credit display logic board.
- (2) Two score display logic board.
- (3) GAME OVER lamp.
- (4) TILT lamp.
- (5) SHADOW BOX WOOD ASSEMBLY.

To remove the SHADOW BOX, first remove the screws from the bottom of the playfield, un-plug all harnesses, and then remove the screws at the top of the playfield.

4-1

SCORE DISPLAY LOGIC BOARD

Part #307-1-7



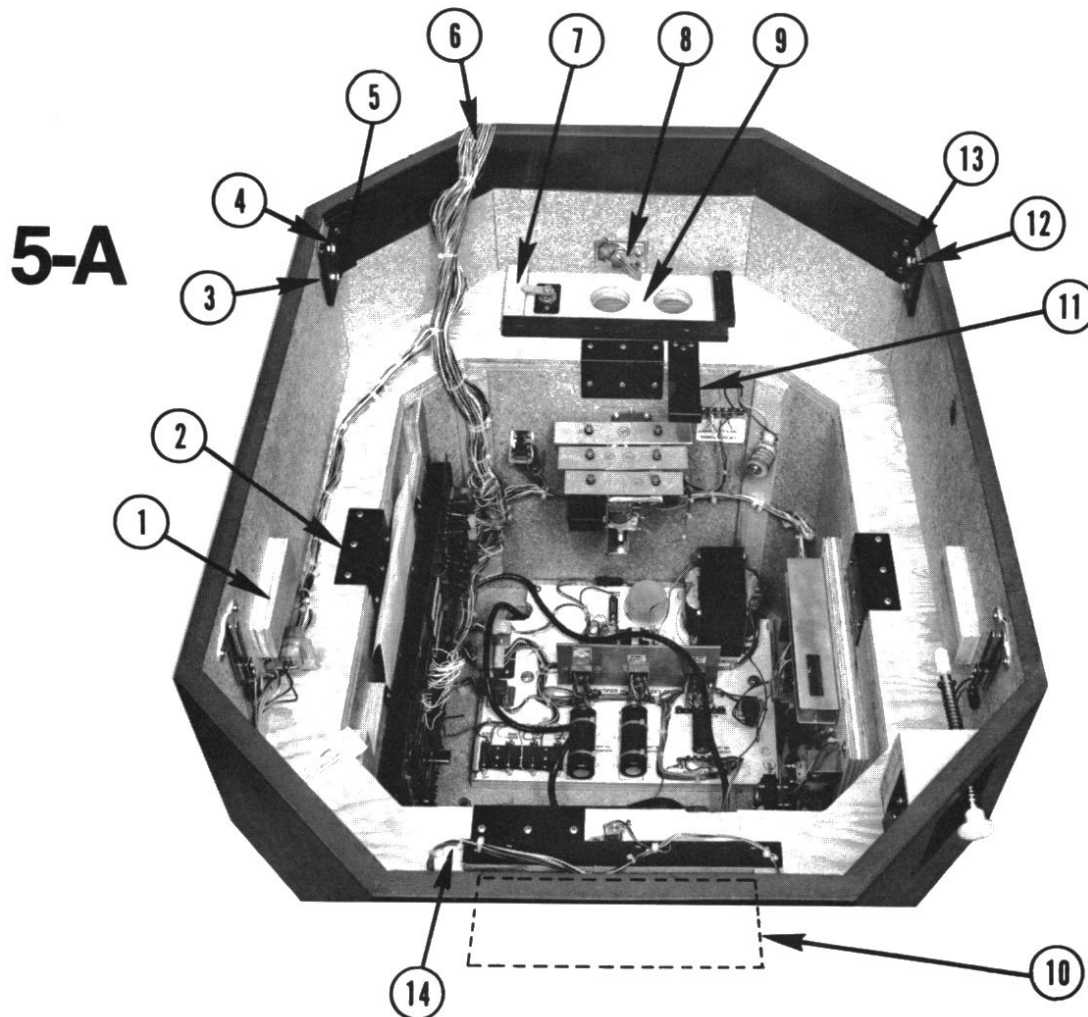
SHADOW BOX WOOD ASSEMBLY

Part #307-1-48

WARNING: You must touch System Ground before attempting adjustments

UPPER CABINET ASSEMBLY

(307-1-3)



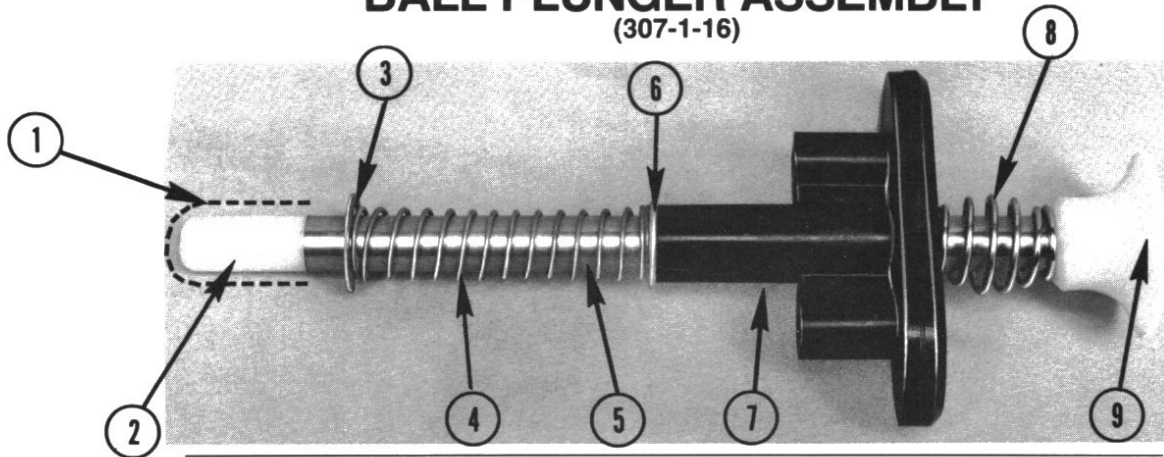
DESCRIPTION OF PARTS IN UPPER CABINET
(Illustration #5-A)

LOCATION	PART NUMBER	DESCRIPTION
1	307-4-34	Playfield wood block
2	307-3-11	Cabinet bracket
3	307-3-36	45° hinge plate brace LH
4	307-3-9	Hinge plate brace LH
5	10120004	Hex head machine bolt 1/4" - 20 x 3/4"
6	307-1-24	Main harness (Playfield)
7	307-4-41	Access door hinge and stop
8	307-8-10	Sash lock
9	307-1-44	Rear access door
10	307-1-45	Front access door (not visible)
11	307-3-34	Playfield catch bracket
12	307-3-37	45° hinge plate brace RH
13	307-3-33	Hinge plate brace RH
14	307-1-27	Flipper harness

WARNING: You must touch System Ground before attempting adjustments

PARTS IN BALL PLUNGER ASSEMBLY
(Illustration #5-B)

BALL PLUNGER ASSEMBLY
(307-1-16)

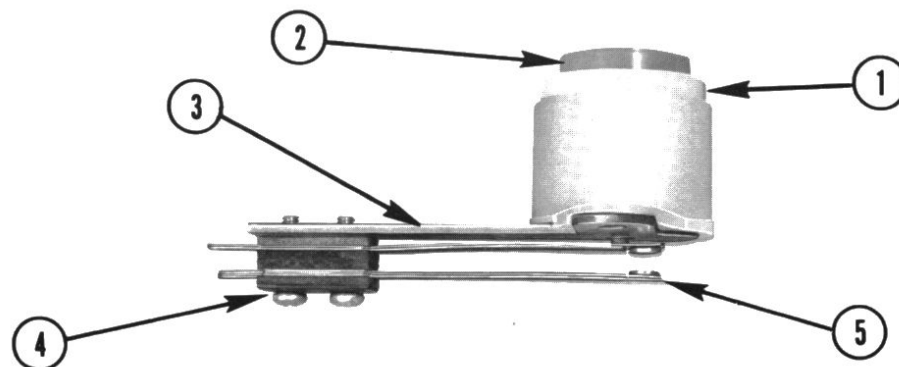


5-B

LOCATION	PART NUMBER	DESCRIPTION
1	264-8-46	Shooter tip (shown dotted)
2	264-5-74	Plunger rod tip
3	10270006	"E" ring (#5133-37)
4	307-8-1	Propeller spring
5	307-2-1	Plunger rod
6	10190035	Washer
7	264-5-33	Guide-plunger rod
8	264-8-7	Shock spring
9	264-5-66	Plunger knob

5.2 PARTS IN FLIPPER ACTIVATOR SWITCH ASSEMBLY
(Illustration #5-C)

FLIPPER ACTIVATOR SWITCH
(292-1-44)



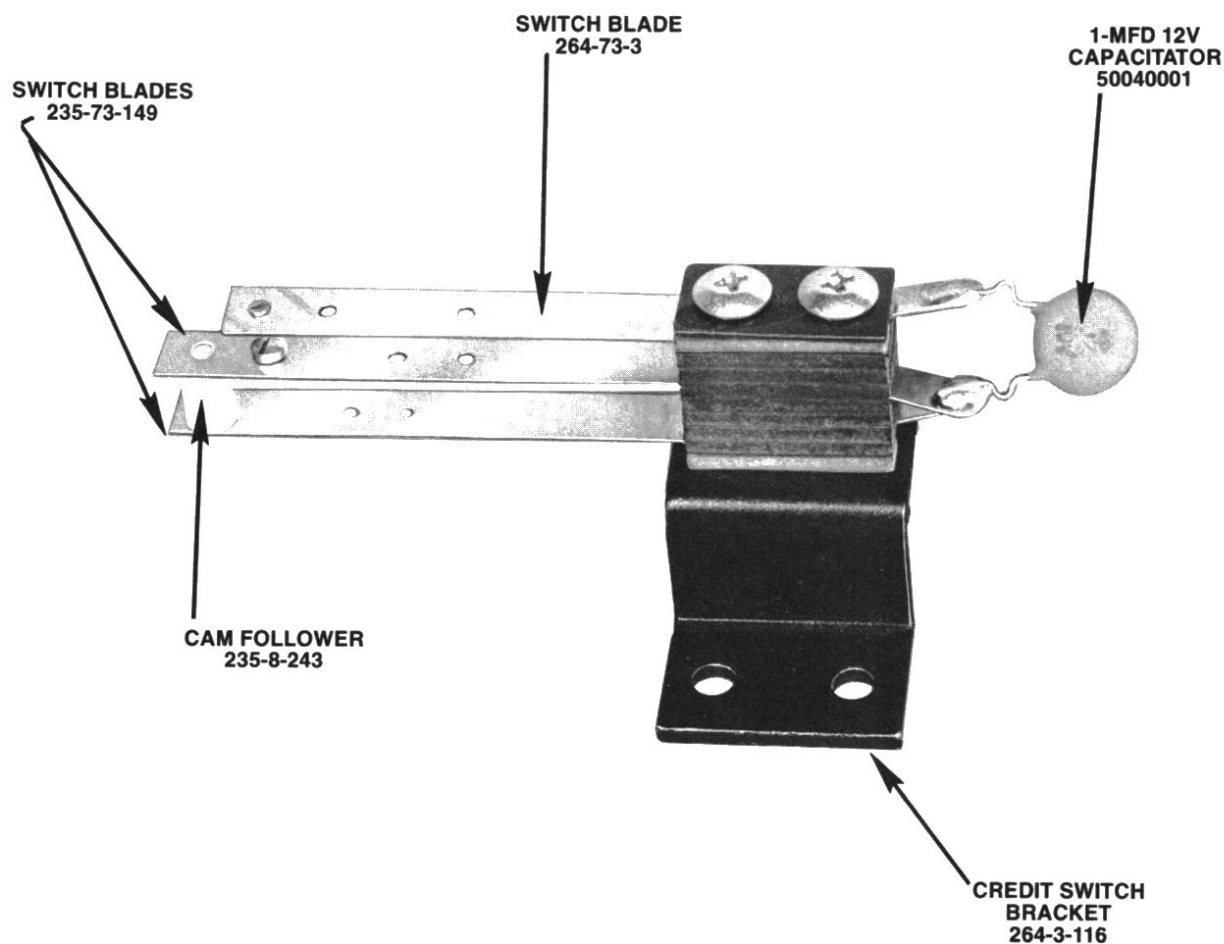
5-C

LOCATION	PART NUMBER	DESCRIPTION
1	264-5-35	Button cover flipper switch
2	264-5-36	Red plastic button
3	264-3-60	Mounting plate
4	235-73-58	Tension plate
5	264-71-75	Flipper push button switch

WARNING: You must touch System Ground before attempting adjustments

CREDIT SWITCH

264-1-182



5-D

6.0 LOWER CABINET

DESCRIPTION OF PARTS

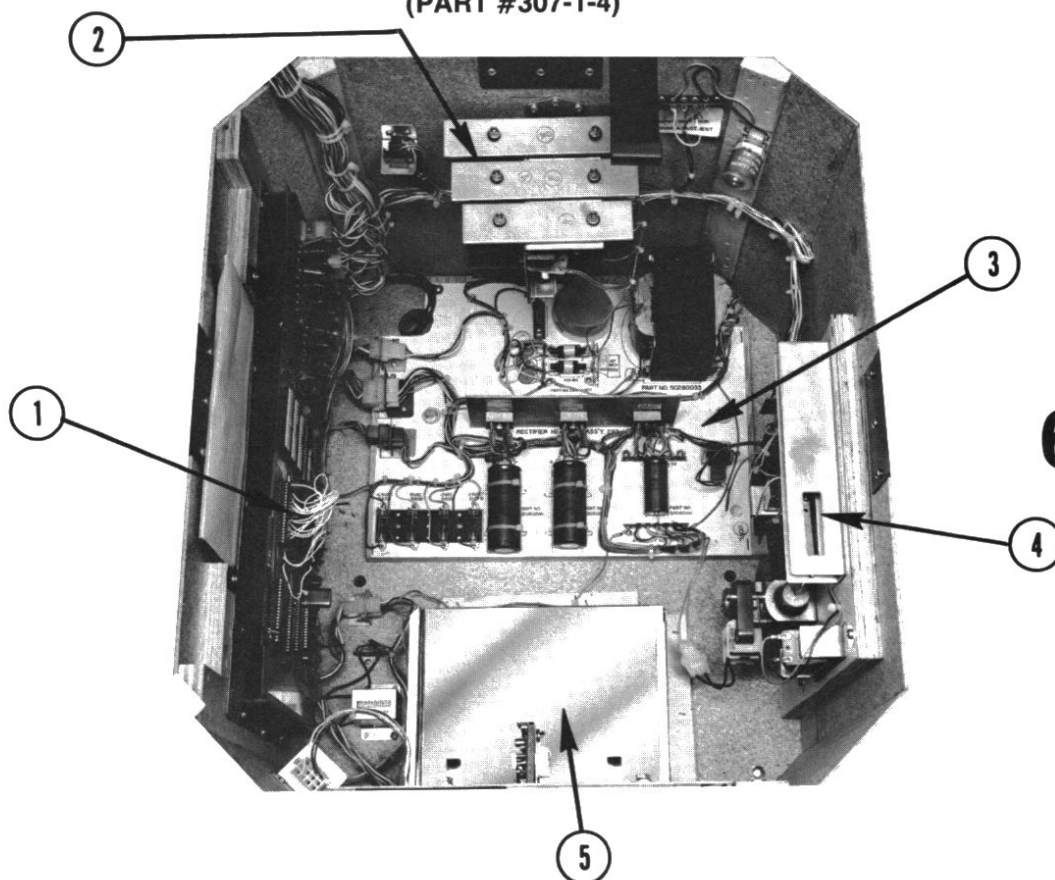
(Illustration #6-A)

LOCATION	PART NUMBER	DESCRIPTION
1	307-1-17	Main Computer Board
2	264-1-98	Chime Assembly
3	307-1-9	Power Supply Assembly
4	307-1-8	Roll-Tilt Assembly
5	307-1-42	Cash Box

WARNING: You must touch System Ground before attempting adjustments

6.0

LOWER CABINET (PART #307-1-4)



6-A

6.1 Cash Box And Coin Counter

CASH BOX LID
Part #307-3-35
for Game with
Wood Coin Door

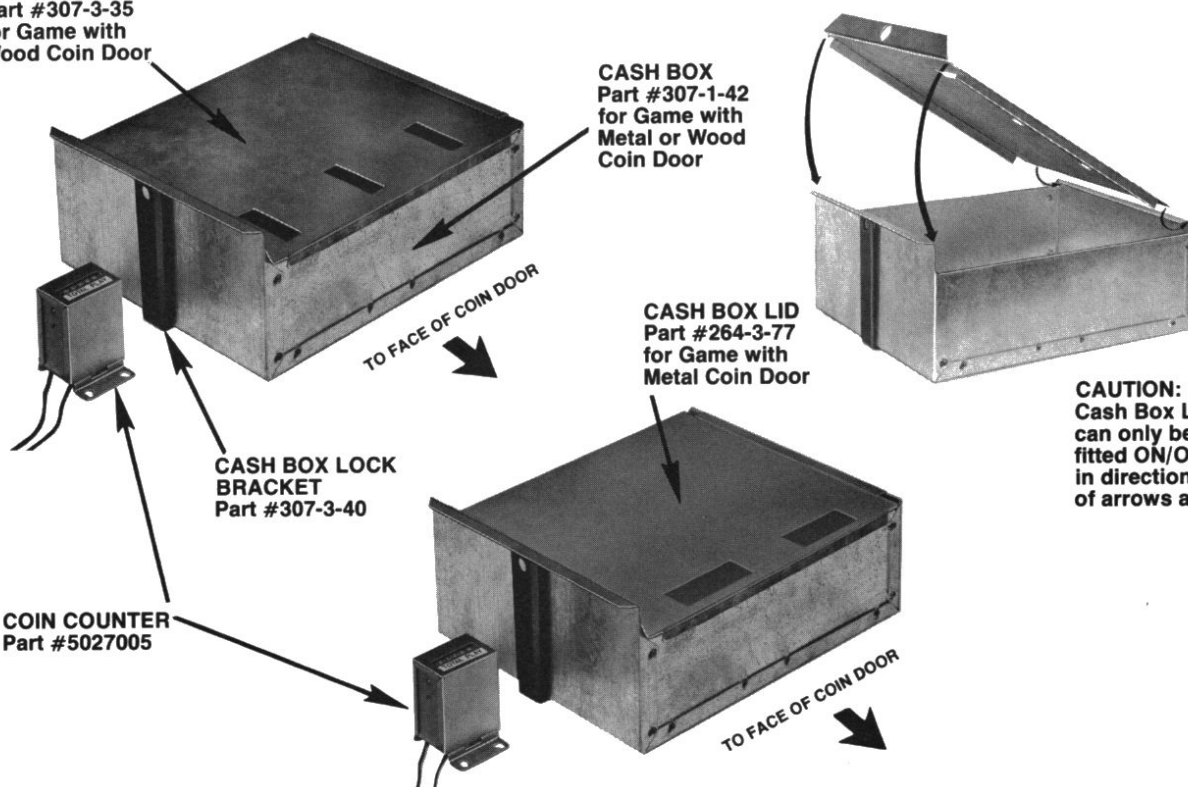
CASH BOX
Part #307-1-42
for Game with
Metal or Wood
Coin Door

CASH BOX LID
Part #264-3-77
for Game with
Metal Coin Door

CASH BOX LOCK
BRACKET
Part #307-3-40

COIN COUNTER
Part #5027005

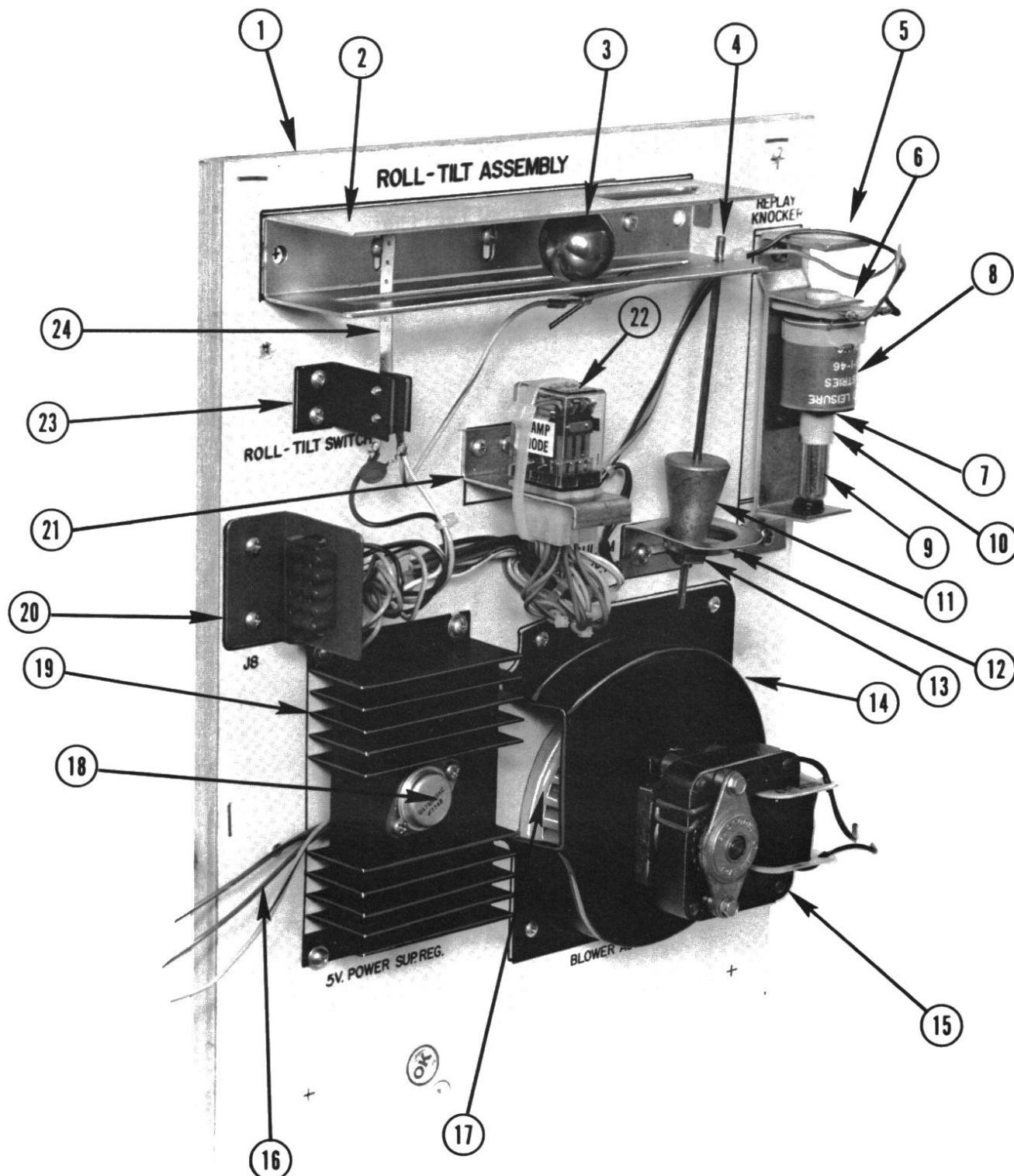
CAUTION:
Cash Box Lid
can only be
fitted ON/OFF
in directions
of arrows above



WARNING: You must touch System Ground before attempting adjustments

6.2 Roll-Tilt

6.2



ROLL-TILT ASSEMBLY
(307-1-8)

6-C

WARNING: You must touch System Ground before attempting adjustments

DESCRIPTION OF PARTS IN ROLL-TILT ASSEMBLY
(Illustration #6-C)

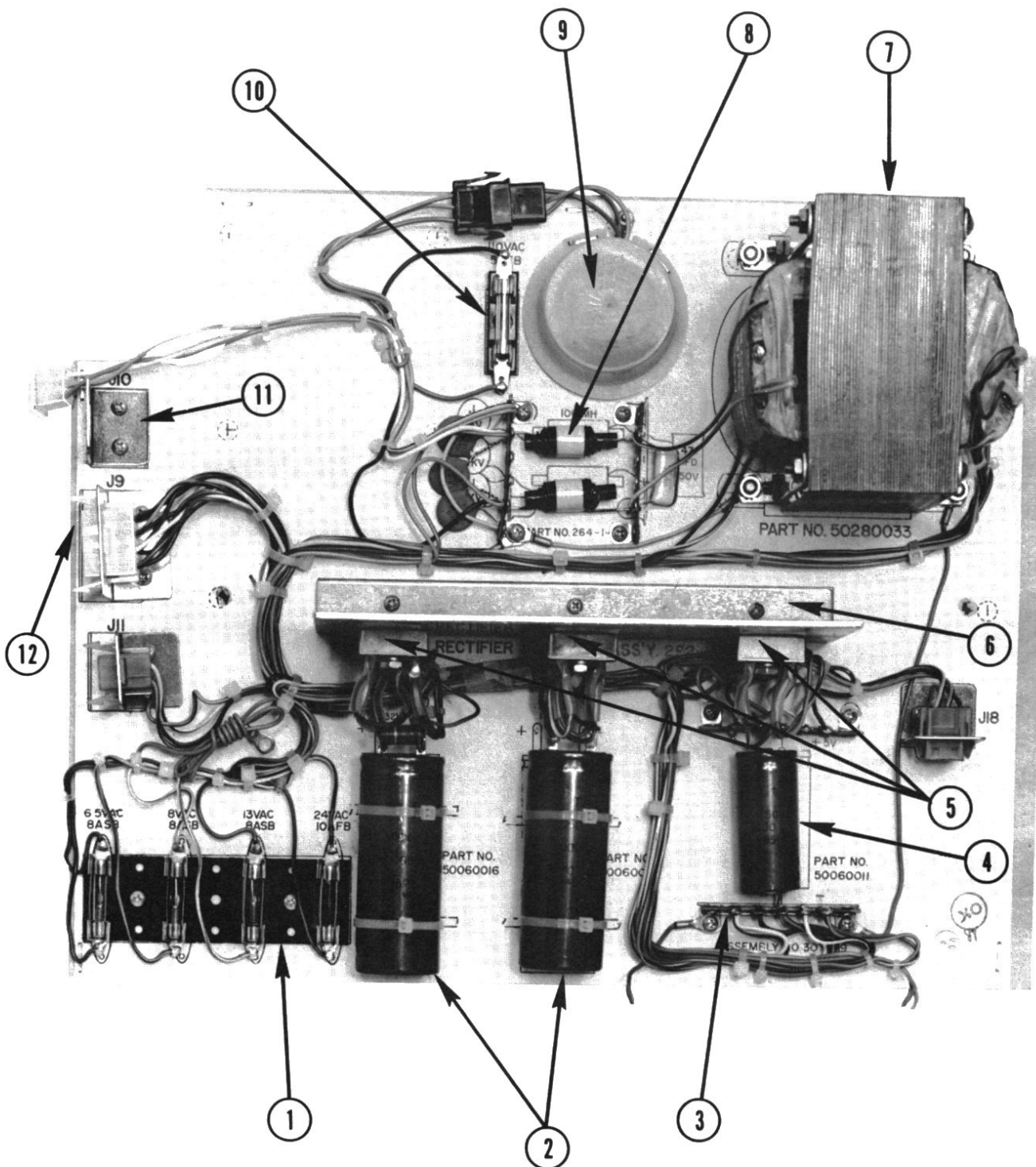
6.2

LOCATION	PART NUMBER	DESCRIPTION
1	307-4-1	Roll-tilt board
2	264-3-62	Roll-tilt bracket
3	264-8-141	Steel ball
4	307-2-2	Rod alignment
5	264-1-86	Replay knocker assembly
6	235-1-91	Knocker bracket-weldment
7	264-3-53	Solenoid bracket #2
8	264-1-137	Coil and diode assembly
9	235-1-45	Solenoid plunger assembly type "D"
10	264-8-142	Coil sleeve type "B" 2.705" long
11	264-5-1	Roll-tilt weight
12	264-3-63	Pendulum bracket
13	10130018	Tinnerman clip
14	271-3-80	Blower top
15	50240053	Blower motor
16	307-1-31	5 V regulator harness
17	231-5-21	Squirrel cage
18	50010033	Transistor regulator 78H05
19	50090004	3" heat sink
20	240-3-169	12-pin connector bracket
21	250-3-11	Bracket small relay
22	264-1-104	Relay assembly
23	307-3-2	Bracket switch holder
24	264-71-113	Switch assembly roll-tilt

WARNING: You must touch System Ground before attempting adjustments

6.3 Power Supply

6.3



6-D

WARNING: You must touch System Ground before attempting adjustments

POWER SUPPLY ASSEMBLY

(307-1-9)

6.3

DESCRIPTION OF PARTS IN POWER SUPPLY ASSEMBLY

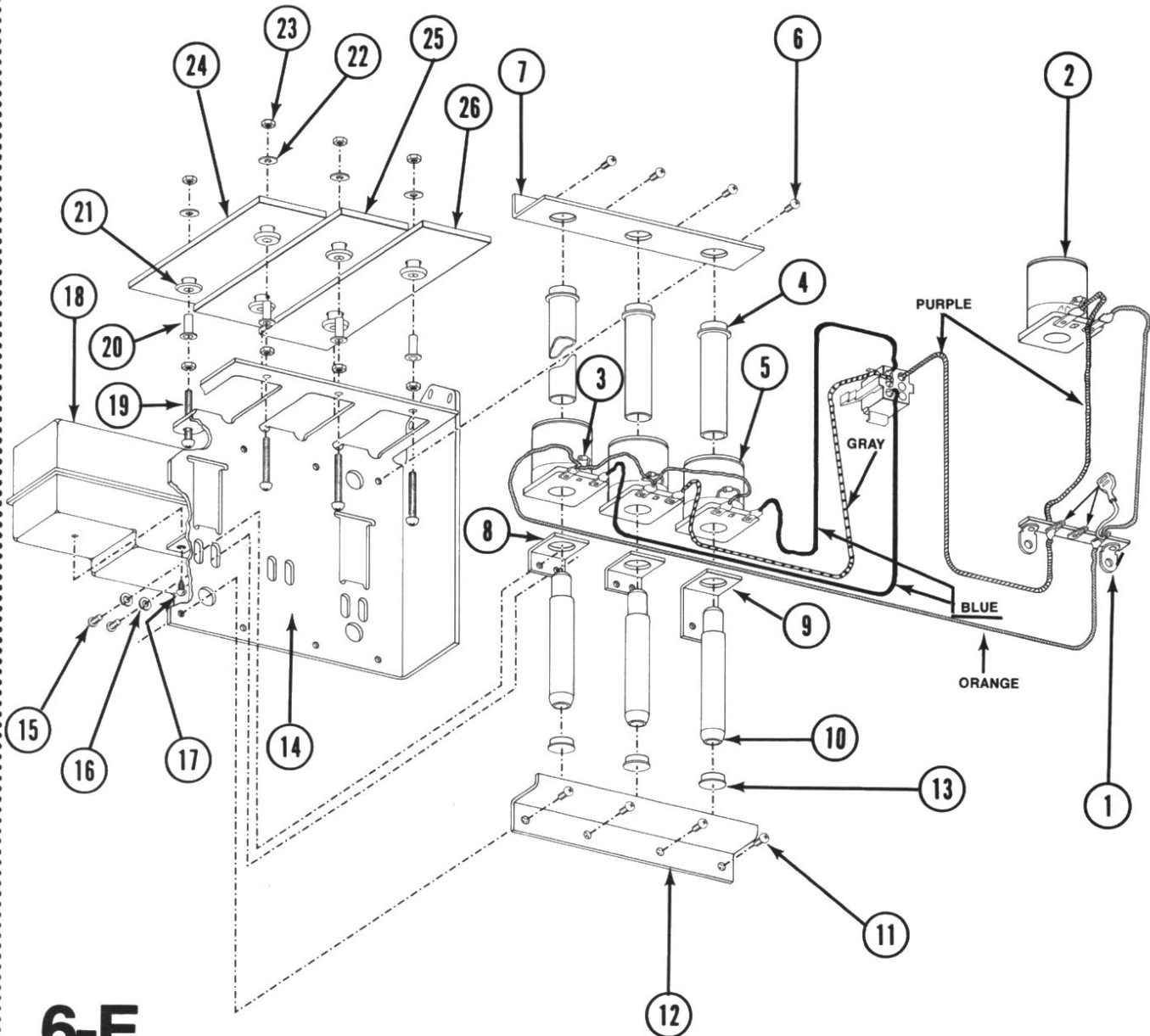
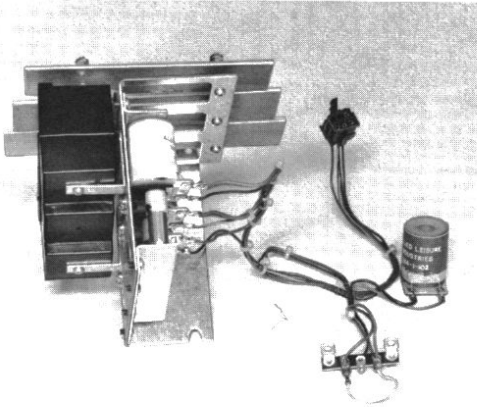
(Illustration #6-D)

LOCATION	PART NUMBER	DESCRIPTION
1	263-10-27	Fuse holder (4-place)
2	50060016	Capacitor 8,000 UF, 40 VDC
3	50220005	5-lug terminal strip
4	50060011	Capacitor 8,000 MFD 16 VDC
5	50100031	Rectifier 25 amp 100 V
6	292-3-2	Heat sink bracket
7	50280033	Power transformer
8	264-1-107	AC line filter assembly
9	288-8-1	Cap lug
10	50230013	Fuse holder
11	240-3-168	6-pin connector bracket
12	240-3-169	12-pin connector bracket

WARNING: You must touch System Ground before attempting adjustments

CHIME ASSEMBLY

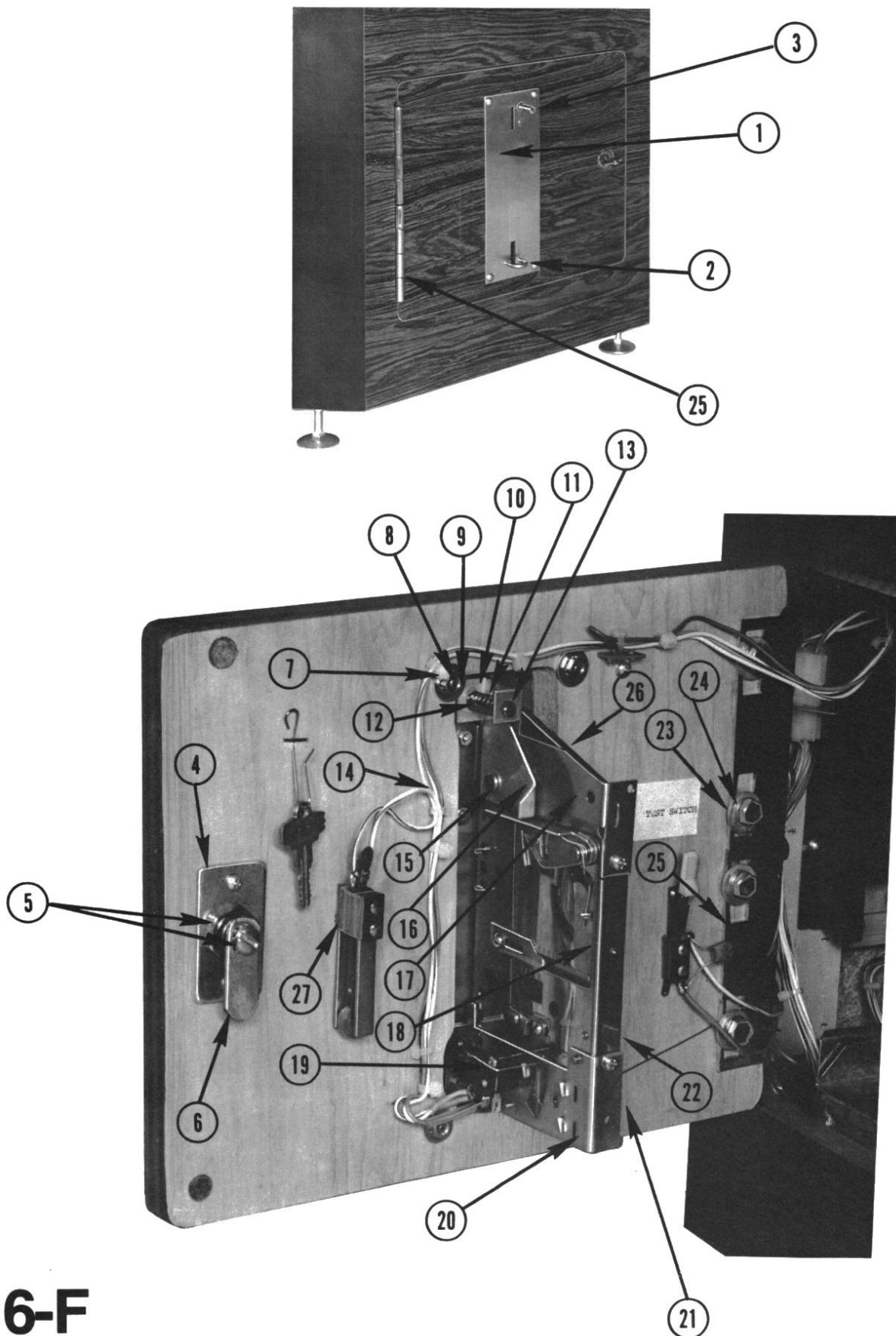
264-1-98



WARNING: You must touch System Ground before attempting adjustments

DESCRIPTION OF PARTS IN CHIME ASSEMBLY
(Illustration #6-E)

LOCATION	PART NUMBER	DESCRIPTION
1	50220003	3-lug terminal strip
2	264-1-102	1152 coil assembly
3	50100010	2-amp diode
4	264-8-142	Coil sleeve
5	264-1-102	Coil
6	10010035	No. 8-32 x 1/4" Phillips P.H.M.S.
7	264-3-103	Bracket coil
8	264-3-53	Solenoid brkt #2
9	264-3-110	Solenoid brkt #3
10	235-1-45	Solenoid plunger type "D"
11	10010035	No. 8-32 x 1/4" Phillips P.H.M.S.
12	264-10-59	Brkt solenoid plunger stop
13	235-8-68	Rubber pads
14	264-3-101	Chime bracket
15	10010031	No. 6-32 x 5/16" Phillips P.H.M.S.
16	10200001	Lock Washer #6 split
17	10040025	No. 6 x 1/2" Phillips P.H.S.M.S.
18	264-1-141	Chime sound box assembly
19	10010106	No. 6-32 x 1" Phillips P.H.M.S.
20	10260002	Eyelet brass
21	292-8-1	Grommet rubber
22	10190029	Washer 3/16" ID 7/16" OD x 1/32" thick
23	10140003	6-32 fiber lock nut
24	264-3-113	Chime Bar "A"
25	264-3-114	Chime bar "B"
26	264-3-115	Chime bar "C"



6-F

DESCRIPTION OF PARTS IN COIN DOOR ASSEMBLY
(Illustration #6-F)

LOCATION	PART NUMBER	DESCRIPTION
1	307-3-18	Coin Acceptor Plate
2	307-2-6	Coin Return Guard
3	307-2-5	Coin Rejector Button
4	235-3-124	Lock Retainer Plate
5	235-8-45	Fortlock
6	264-3-152	Lock Tongue
7	10190028	Washer 3/16" ID 5/8" OD
8	10150004	8/32" Kep Nut
9	10110002	8/32" x 1-1/8" Carriage Bolt
10	307-5-2	Nylon Washer
11	307-8-12	Compression Spring
12	307-2-5	Coin Rejector Button
13	10270001	"E" Ring (#5133-12)
14	307-1-29	Assembly Cable
15	307-2-4	Rivet Coin Reject Assy
16	307-3-27	Coin Reject Lever
17	307-3-26	Coin Rejector Track Mtg Brkt
18	235-8-516	Coin Acceptor (25¢)
19	50130003	Cherry Switch SPDT (E-51)
20	307-3-23	Coin Switch Plate
21	307-3-24	Coin Switch Guide
22	307-3-22	Coin Rejector Cup
23	10190035	Flat Washer 1/4" ID 9/16" OD
24	10120004	Hex Head Machine Bolt 1/4" - 20 x 3/4"
25	307-10-23	Hinge
26	307-3-25	Coin Track
27	288-1-19	Slam Switch

WARNING: You must touch System Ground before attempting adjustments

7.0 ROUTINE MAINTENANCE ON LOCATION

7.0

7.1 Introduction

Self-test routines are programmed into the game design, and are particularly useful for routine maintenance.

The first test is automatic and occurs on POWER-UP as outlined in paragraph 7.2 (re-set signal test).

The second series of self-diagnostic tests causes the computer board to exercise each of the major assemblies in such a way as to make the faults, if any, obvious. These tests are outlined in paragraph 7.3. (For Self-Diagnostic Switch see Illustration #7-A). You can verify which test mode you are in by observing the CREDIT DISPLAY.

NOTE: Please remember that, once the self-diagnostic test is initiated, the only way the game can be returned to NORMAL operation is by turning the power OFF and then back ON.

7.2 Re-Set Signal Test

The purpose of the RE-SET CIRCUIT is to guarantee that the system will start up in a known state upon the application of power or during an intense static discharge.

Turn the power OFF and then ON.

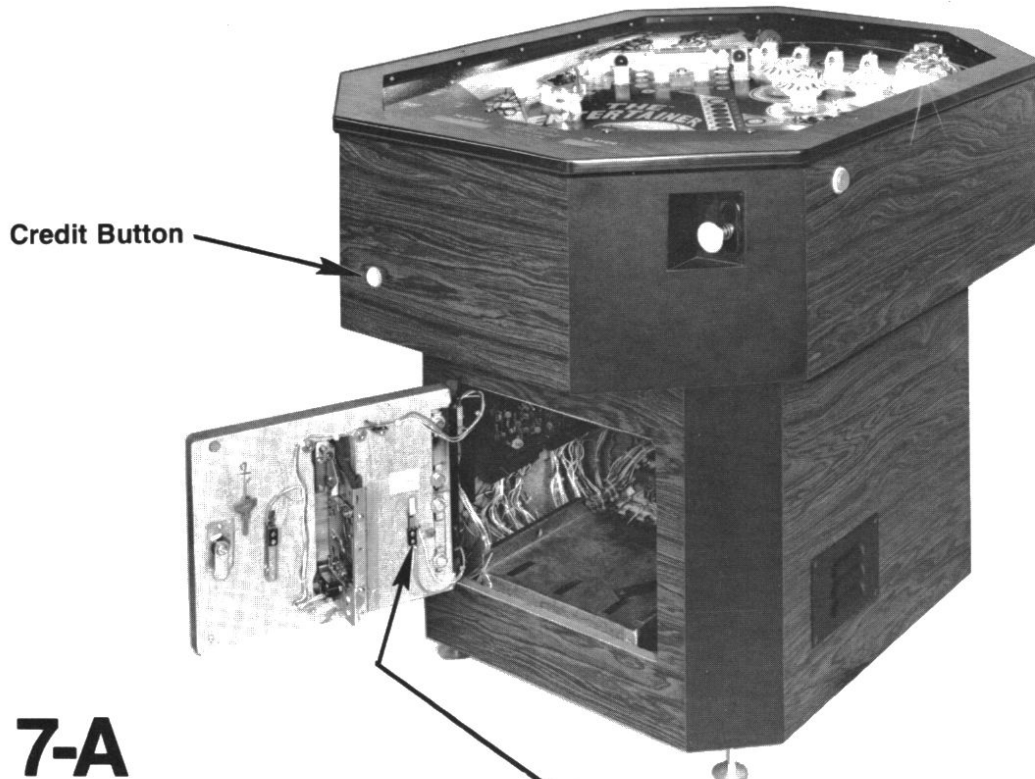
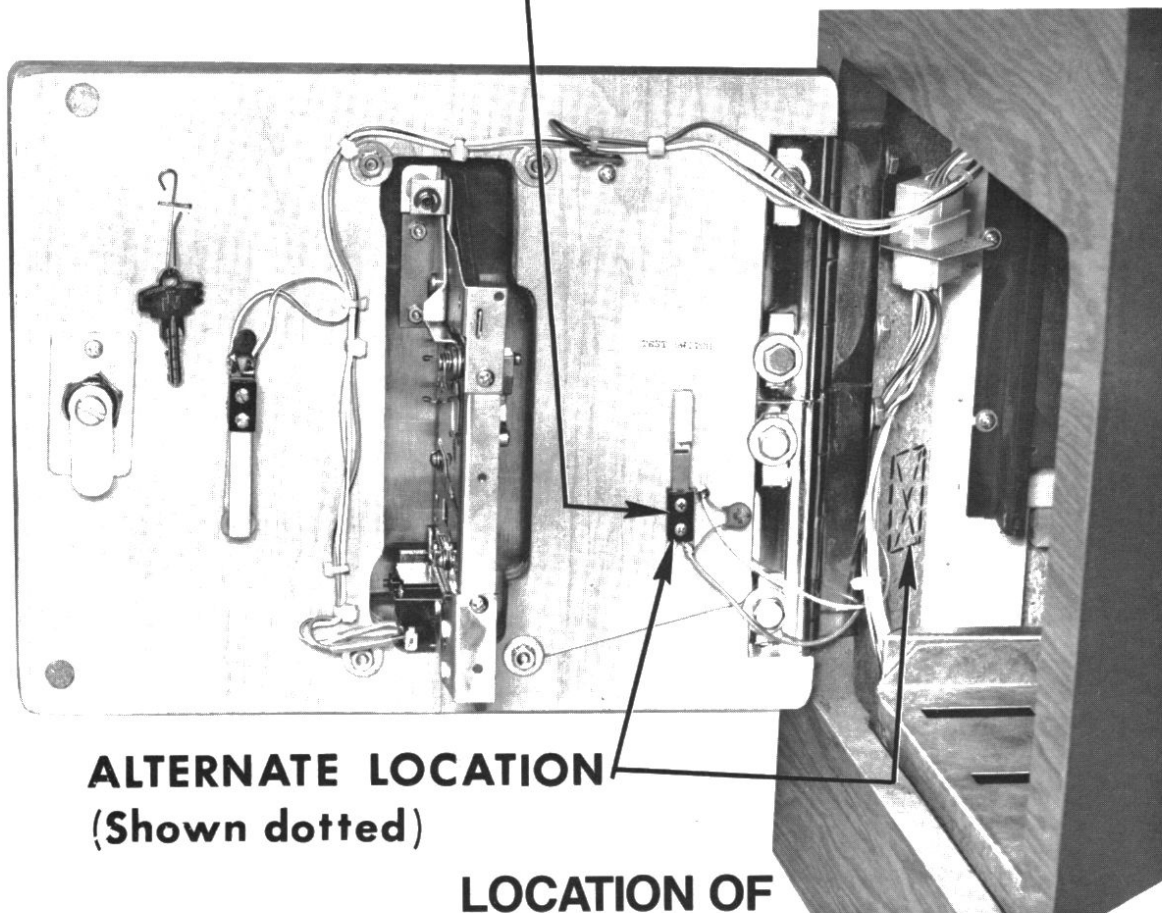
For approximately 2 seconds after power is re-applied, observe the following:

- (1) Score displays are extinguished.
- (2) FREE GAME credit display may show erroneous data.
- (3) Right REBOUND KICKER and left 10-POINT lamps close to the FLIPPERS are OUT.
- (4) SAME PLAYER SHOOTS AGAIN lamp is ON.
- (5) GAME OVER lamp is OFF.

After the 2 seconds have expired, observe the following:

- (1) SCORE displays re-light and re-set to all 0's.
- (2) FREE GAME credit display lamps light and re-set to 00.
- (3) GAME OVER lamp flashes.
- (4) REBOUND KICKER and 10-POINT lamps come ON.
- (5) SAME PLAYER SHOOTS AGAIN lamp goes OFF.
- (6) No COILS (solenoids) should energize at this time.

In the event that the game does not re-set as outlined above, please refer to paragraph 8.1.

**7-A**

**ALTERNATE LOCATION
(Shown dotted)**

**LOCATION OF
SELF-DIAGNOSTIC PROGRAMMING SWITCHES**

WARNING: You must touch System Ground before attempting adjustments

7-B



PLAYFIELD SWITCHES IDENTIFICATION NUMBERS*

*The computer identifies only the numbers inside the arrows locating the switches.

10	Left Thumper Bumper	220	Raise Drop Target B
20	Middle Thumper Bumper	230	Raise Drop Target C
30	Right Thumper Bumper	240	1000 Pt. Extra Ball When Lit (Top)
40	Left Bull's-Eye	250	Drop Target A
50	Right Bull's-Eye	260	Drop Target B
60	Left Sling Shot	270	Drop Target C
70	Right Sling Shot	280	Drop Target D
80	Outhole	310*	Tilt Sw (both Roll & Pendulum)
140	Special	320*	Credit Switch
150	Rail Switches (4 switch)	330*	Slam
160	Ball in Play Switch (optional)	340*	Coin Switch 1
170	Raise Drop Target A	350*	Coin Switch 2
180	Raise Drop Target D	360*	Coin Switch 3
210	500 Pt. Sw. (Lower Left, Top & Lower Right)		

*Not shown in illustration 7-B

WARNING: You must touch System Ground before attempting adjustments

7.3.1 Test Mode One (Credit & Score LED's)

To initiate this test, remove the ball from the OUT-HOLE and press the Self-Diagnostic Switch (see illustration #7-A). Both score display and credit display LED's should sequence from 0 through 9, and repeat.

NOTE: The first digit on the right side of both score displays will always be zero.

7.3.2 Test Mode Two (Stuck Switch and Switch Verification Test)

- (a) Press CREDIT button for 5 seconds. (illustration 7-A).
 - (1) Game credit display shows "02".
 - (2) Left side score display will show the number of any switch that is closed.
- (b) Momentarily press each switch to verify recognition by the computer.

7.3.3 Test Mode Three (Vibration Test)

- (a) Press the test switch for 2 seconds. The game credit display should now show "03".
- (b) Tap very lightly the surface of the PLAYFIELD.

If there are any switches not correctly adjusted (gap too close), the number of such switch will be displayed and latched in score unit #1. Make the necessary adjustments as per paragraph 8.5. To unlatch the number from the score display, press the GAME START button.

7.3.4 Test Mode Four (Lamps Test "A")

Press the test switch for 2 seconds ... credit display now shows "04". Ignore any numbers on the score display. The THUMPER BUMPER lamps and background lamps should be lit throughout this test. The following lamps also should be lit:

- (a) EXTRA BALL WHEN LIT.
- (b) COLLECT VALUE right 1, 2, 3, and 4.
- (c) COLLECT VALUE left 1, [REDACTED]
- (d) Lower right REBOUND KICKER.
- (e) SPECIAL WHEN LIT.

NOTE: Ignore GAME OVER lamp.

7.3.5 Test Mode Five (Lamps Test "B")

Press the GAME START button for 2 seconds ... credit display now shows "05". Please observe what happens:

These lamps should be lit:

- (a) COLLECT VALUE left 1, 2, 3 and 4.
- (b) 10,000 BONUS lamp, DOUBLE BONUS lamp, and TRIPLE BONUS lamp.

7.3.6 Test Mode Six (LED's and Lamps Test "A")

Press the CREDIT button for 2 seconds ... credit display now shows "06". These lamps should be lit:

- (a) SAME PLAYER SHOOT'S AGAIN (on older machines, this reads "SAME PLAYER ENCORES").
- (b) BALL IN PLAY LED 1, 2, 3, 4 and 5.

7.3.7 Test Mode Seven (LED's and Lamps Test "B")

7.3.7

Press the CREDIT button for 2 seconds ... credit display now shows "07". The following should happen:

PLAYERS 1 and 2 LED's ON.

NOTE: In this MODE all score displays should extinguish.

7.3.8 Test Mode Eight (Lamps Test "C")

Press the CREDIT button for 2 seconds ... credit display now shows "08". The following should happen:

- (a) The BONUS lamps count down from 9,000 to 1,000. (The 10,000 lamp was tested in MODE FIVE.)
- (b) The GAME OVER lamp flashes after the 1,000 BONUS lamp.
- (c) The TILT lamp flashes after the GAME OVER lamp.

NOTE: Refer to paragraph 8.3 for troubleshooting instructions on the lamps.

7.3.9 Test Mode Nine (Coils Test)

Press the CREDIT button for 5 seconds ... credit display now shows "09". Ignore the score displays during this test. The coils (solenoids) should energize in the following sequence:

- (a) Left THUMPER BUMPER and DROP TARGET "A".
- (b) Middle THUMPER BUMPER and DROP TARGET "B".
- (c) Right THUMPER BUMPER and DROP TARGET "C".
- (d) DROP TARGET "D".
- (e) Left REBOUND KICKER.
- (f) Right REBOUND KICKER.
- (g) HOLE KICKER.
- (h) 1,000-point CHIME (low tone).
- (i) 100-point CHIME (middle tone).
- (j) 10-point CHIME (high tone).
- (k) REPLAY KNOCKER.

NOTE #1: FLIPPER buttons must be held in for FLIPPER coils to energize immediately after REPLAY KNOCKER.

NOTE #2: If coils do not function properly, refer to paragraph 8.4.

7.3.10 Test Mode Ten (Combination Test)

This test is used primarily for preliminary wear testing procedure at the factory, but can be used as a method of testing newly installed logic board.

Press CREDIT button for 10 seconds. The CREDIT display should now display "0c".

8.0 TROUBLE-SHOOTING GUIDE

8.0

Never EXPERIMENT with any mechanism! Improper adjustment or makeshift repair will only cause either serious damage to other parts of the machine or repeated failure of the part.

To properly service/repair this machine in a minimum time, it is necessary to isolate the problem to a specific circuit. A system of logical elimination will reduce the number of possible trouble spots . . . the self-diagnostic tests (refer to paragraphs under 7.3) built into this game are designed particularly to expedite location of problems.

In many situations, attempting to play the game and observing the results may be helpful . . . also, careful reasoning along with reference to the schematic may determine the cause of the problem.

A visual inspection of the components in a suspected area may often save time. Always look for a possible loose wire, a bad connection at a plug or socket, or a broken/unhooked spring.

8.1 Re-Set Circuit

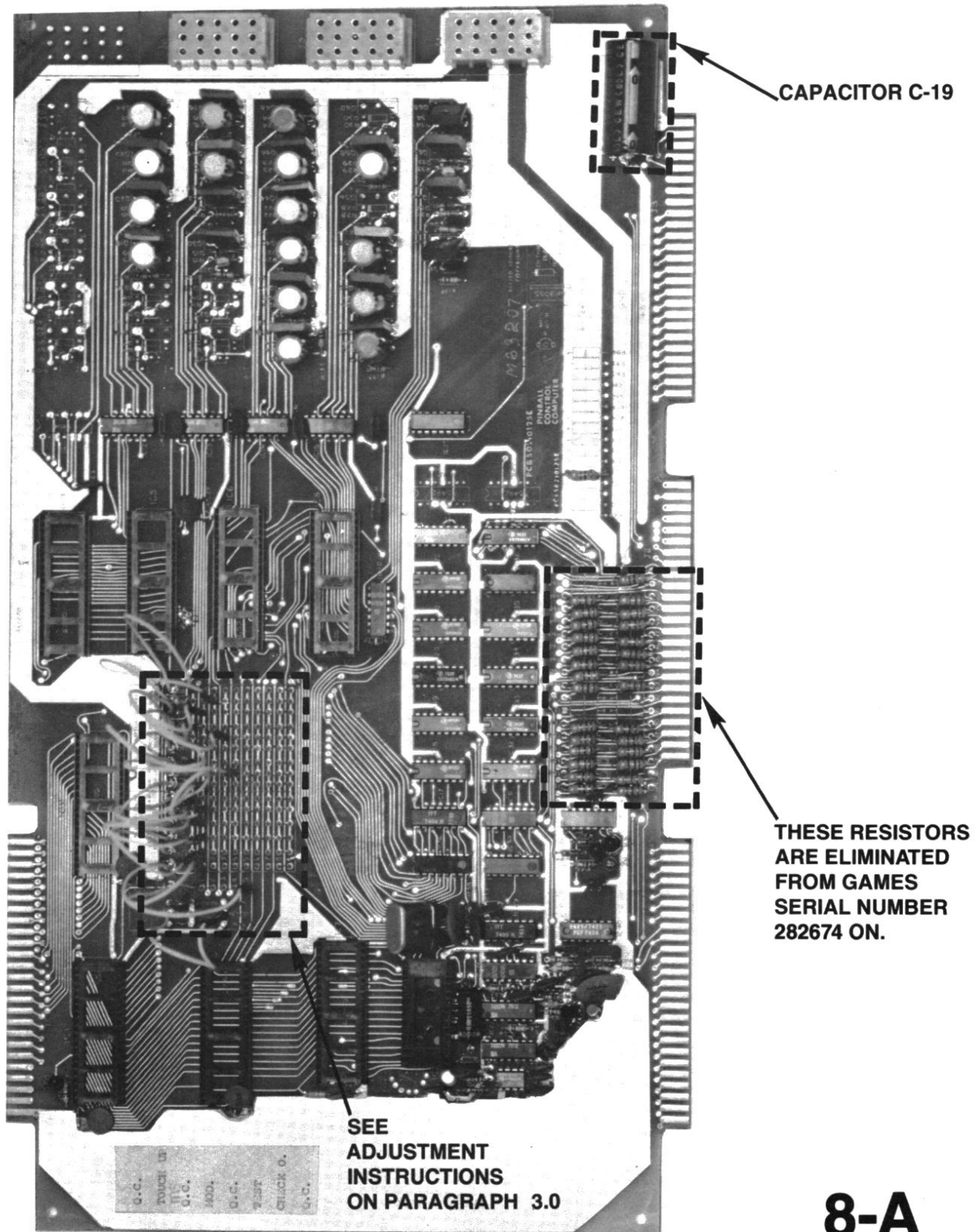
Upon application of power to the game, LED #1 on the main computer board (Illustration #8-A) should momentarily light for approximately 2 seconds and then extinguish, thereby indicating a proper re-set condition. If this LED does not come on, or refuses to extinguish, check the 5-V power supply. If the computer board has 5-V across C-19 (the large capacitor in the lower right-hand corner Illustration #8-B) and LED #1 is not functioning properly, then the malfunction is the re-set circuitry on the main board.

The 5-V power supply is used to supply regulated 5-V power to the computer board and the peripheral display boards. The circuit (refer to the game schematic) is composed of a bridge rectifier, two capacitors and a 78H05 regulator. This circuit should regulate between 4.8 VDC and 5.2 VDC. This 5-V can be measured across the 8,000 mfd output capacitor. The input capacitor should have approximately 13-14 VDC.

The 5-V may also be measured across C-19 the 2,200 mfd capacitor on the computer board. (Please see Illustration #8-B).

COMPUTER CONTROL LOGIC BOARD ^{8.1}

(307-1-17)



8-A

WARNING: You must touch System Ground before attempting adjustments

8.2 Displays

8.2

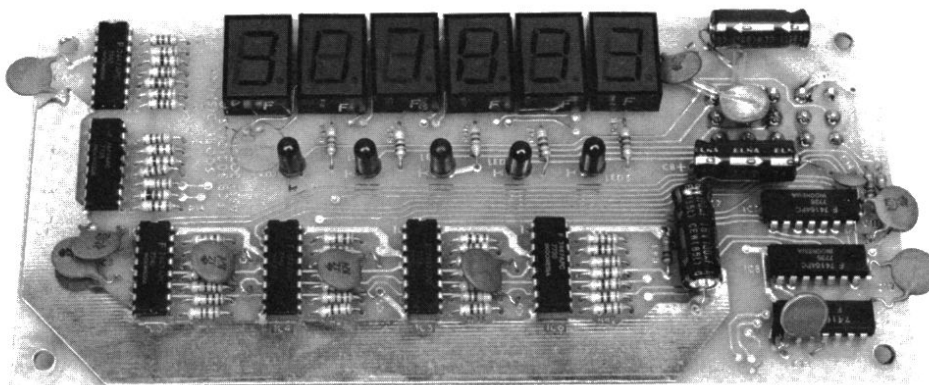
ALWAYS DISCONNECT power BEFORE removing or replacing any printed circuit boards.

8.2.1 Score display (Illustration #8-B)

The best way to test for the proper score unit function is in the Self-Diagnostic Test procedure. If a score unit is suspected, it can be inter-changed with another unit known to be good.

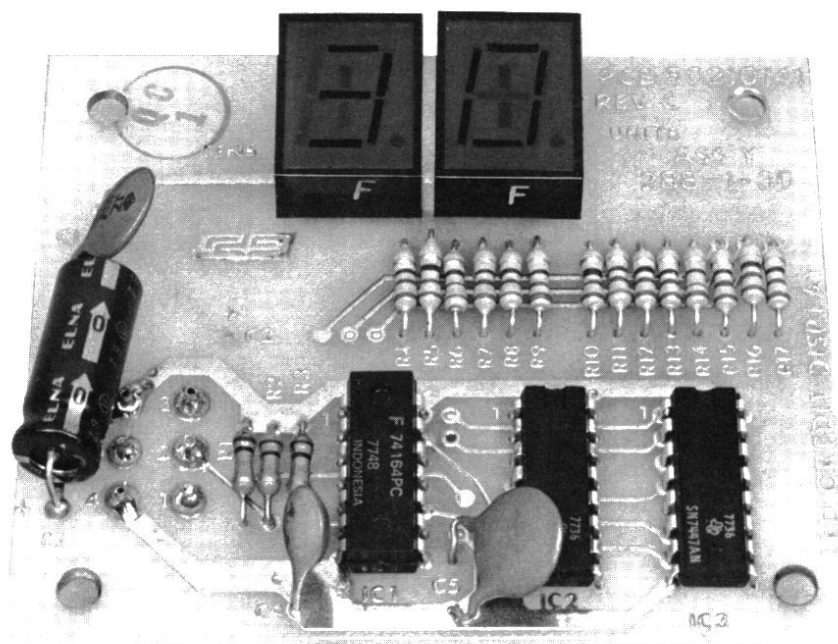
The following signals are necessary to light the score display:

- (1) 4.8–5.2 VDC.
- (2) 7.8 VDC.
- (3) Proper score blanking (LED #4 on the main computer board should be momentarily flashing).
- (4) Proper data from the computer board (LED #3 should be momentarily flashing).
- (5) Proper score clock signal.



8-B

SCORE DISPLAY
LOGIC BOARD
Part #307-1-7



8-C

CREDIT DISPLAY
LOGIC BOARD
Part #288-1-36

WARNING: You must touch System Ground before attempting adjustments

8.2.1

A quick way to check for score blanking is to check LED #4 on the main computer board. LED #4 should be ON during power re-set, and should momentarily blink whenever score unit #1 is updated or blanked out. If you are uncertain about whether the problem of the score units being continually extinguished is due to a bad blanking signal, then you should perform the following:

- (1) Remove game power.
- (2) Completely remove the computer board.
- (3) Re-apply game power. If the score unit now lights, then the faulty blanking signal is due to a bad computer board. Ignore erroneous numbers.

8.2.2 Credit Display

The operation of the CREDIT display board (please see Illustration #8-C) is identical to that of the SCORE unit **with the exception** that the CREDIT unit does not require a blanking signal.

TO REMOVE THE SCORE or CREDIT displays, you should proceed as follows:

- (1) Remove the score glass.
- (2) Unscrew the respective mounting screws.
- (3) Separate the connectors and remove the unit.

8.3 Lamps

The background lamps, such as ENTRANCE GATE lamps, with the exception of the REBOUND KICKER lamps, are in normal circuit operating on 6 VAC as shown in the schematic.

All lamps tested in the self-diagnostic mode are driven from the main computer board. All of these lamps have one side tied to +7.8 VDC.

The other side of each lamp is switched by the computer board to system ground.

If, during the self-diagnostics, a lamp is suspected, the socket should be checked with a known-good lamp.

If none of the lamps light during the self-diagnostics test, then troubleshoot the +7.8 VDC power supply.

8.3

If the main computer board is suspected, a quick test to check the continuity of a particular lamp circuit is as follows:

- (1) Remove game power.
- (2) Completely remove the main computer board.
- (3) Re-apply game power.

REMEMBER: The only function the computer board performs when turning on a lamp is to supply system ground. Thus, if you take a jumper from system ground to the output pin from the computer board which connects to the lamp, the lamp should light if the harness and power supply are working properly.

WARNING: Do NOT do this unless the computer board is removed!

Refer to the game schematic to get proper pin connections. If the suspected circuit functions properly, then the fault is on the computer board.

The GAME OVER, TILT and REBOUND KICKER lamps all have one side tied to +7.8 VDC. The other side of the lamp is switched to system through a circuit similar to that which drives the coils... if suspected, these lamps can be tested in the same manner as above.

8.4 Coils

All of the coils in the game (including the FLIPPER power relay located on the ROLL/TILT assembly) have one side tied to +32 VDC. The computer board switches these coils to system ground to complete the circuit thus energizing the coil.

If a coil driver on the computer board is suspected, a quick test of the remaining circuitry is performed as follows:

- (1) Remove system power.
- (2) Completely remove main computer board.
- (3) Re-apply power.

REMEMBER: The only function the computer board performs when turning on a coil is to supply system ground. Thus, if you take a jumper from system ground to the output pin from the computer board which connects to the coil, the coil should energize if the circuit is working properly.

WARNING: DO NOT DO THIS UNLESS THE COMPUTER BOARD HAS BEEN COMPLETELY REMOVED FROM THE GAME!

8.5 Switch Adjustments

8.5

NOTE: Before cleaning or adjusting switch assemblies, be sure to remove power from the game.

All switch assemblies on the game contain basically the following: leaf springs, contacts, spacers and insulators.

Some leaf springs have contacts and others do not. The leaf springs without contacts are the ones used for adjusting the separation between those that do... for which the special CONTACT ADJUSTER must be used.

Before attempting to adjust a switch assembly, be sure that the screws used to hold the assembly to the mounting surface are tight. If not, tighten the screw closer to the contact first. This will prevent the assembly from being secured in a manner that would cause the leaf springs to fan out.

Unless instructed otherwise in this manual, contacts should be adjusted for approximately 1/16" in the OPEN position and 1/64" follow through in the CLOSED position.

The contacts are plated to resist corrosion and, except for the FLIPPER ACTIVATOR SWITCHES, should not be filed or sanded. Such action would damage the finish, thereby causing corrosion. The contacts should be dry and free of dust and dirt. The proper way to clean the contacts is by placing an absorbent piece of paper between them, close them, and then gently slide out the paper. This may be repeated if necessary until the contacts are clean.

Tarnish on the flipper activator switches can be removed with a contact file followed by a burnishing tool.

All contacts should be cleaned or adjusted ONLY when they are found to be the source of game malfunction. If a switch is suspected of not performing its function, please refer to the SELF-DIAGNOSTIC TEST MODE TWO (paragraph 7.3.2) to verify switch recognition by the computer board.

Severely pitted contacts must be replaced as an assembly.

CONTACT ADJUSTMENT

8.5

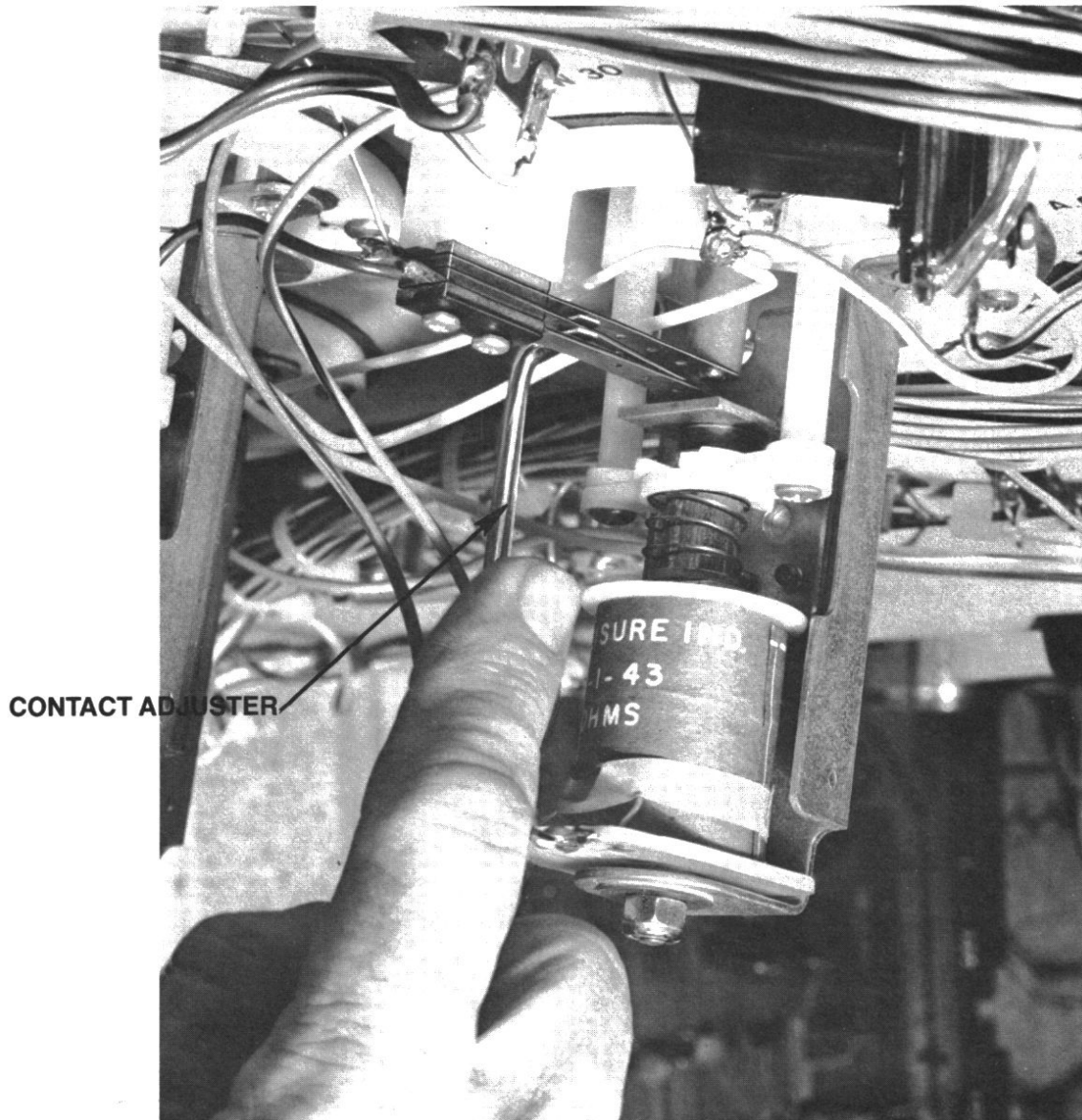
The CONTACT ADJUSTER (please see Illustration #8-D) is vital for proper switch adjustment. We do stress, however, that improper or over-use of the tool can cause fatigue or eventual breakage of switch blades.

Before attempting to adjust a switch, be sure that such adjustment is necessary by first going to the Self-Diagnostic TEST MODE TWO (paragraph 7.3.2) to determine whether or not the switch is being recognized by the computer board.

If it is NOT being recognized, then clean the contacts and go back to Self-Diagnostic TEST MODE TWO. If the switch is still not being recognized, then insert the contact adjuster in approximately the same location as shown in Illustration #8-D. Apply only a small amount of pressure!

CAUTION: It is very important not to over-bend the switch blade in the attempt to adjust it properly.

After the adjustment has been made, then go back to Self-Diagnostic TEST MODE TWO. When you are satisfied that the switch is being recognized, then proceed to Self-Diagnostic TEST MODE THREE (paragraph 7.3.3) to verify that the contacts are not too close.

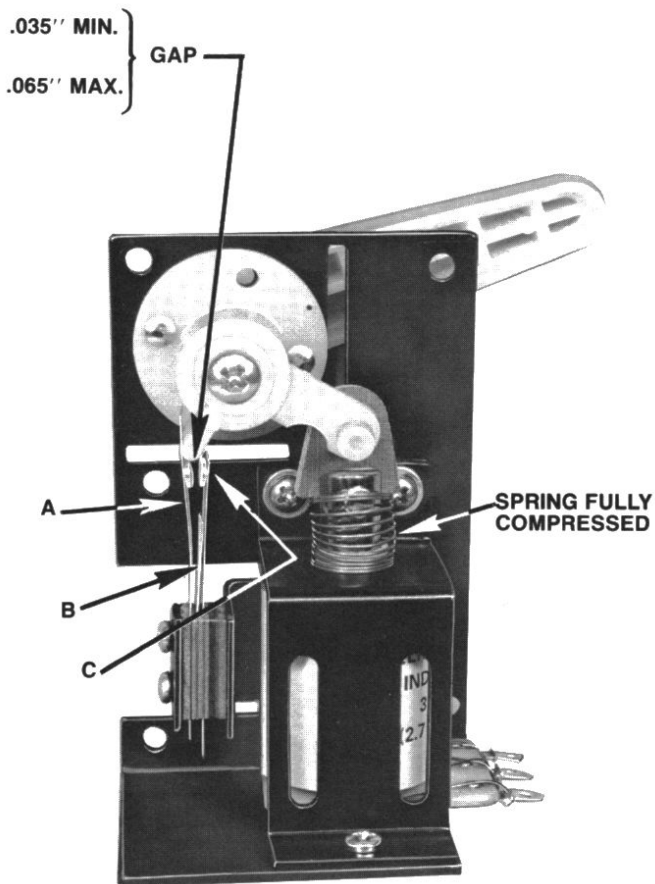


8-D

WARNING: You must touch System Ground before attempting adjustments

FLIPPER SWITCH CONTACTS

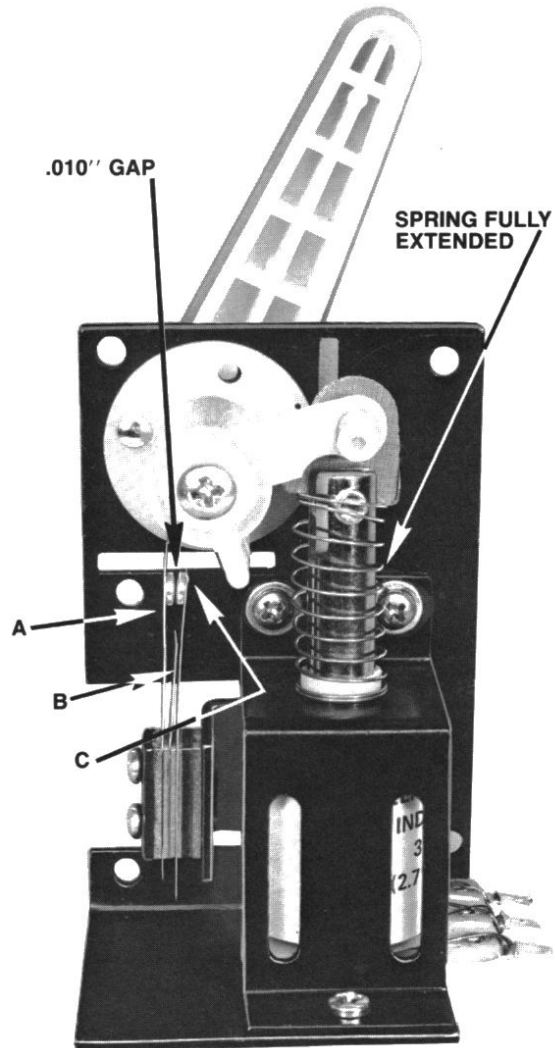
8.5



8-E

IN OPEN POSITION

The proper adjustment of flipper switch with contacts in the "OPEN POSITION" is to have Blade "A" and "C" having a minimum gap of .035" and a maximum gap of .065". This is accomplished by having Blade "B" touching Blade "C", thus preventing Blade "C" from moving, at desired gap.



8-F

IN CLOSED POSITION

The proper adjustment of flipper switch with contacts in the "CLOSED POSITION" is by having:

- Blade "A" straight up (vertical)
- Blade "C" being bent from Blade "A"
- Blades "B" and "C" having a minimum gap of .010".

WARNING: You must touch System Ground before attempting adjustments

9.0 SYMPTOMS AND SOLUTIONS**9.0****9.1 Reference Chart**

PROBLEM DESCRIPTION	NO POWER FROM AC OUTLET	BLOWN FUSE	ELECTRICAL CONNECTION	SWITCH CONTACT ADJUSTMENT	MECHANICAL ADJUSTMENT	HARDWARE LOOSE OR BROKEN	FAILED ELECTRICAL PART	FAILED MECHANICAL PART	FAILED MAIN LOGIC
All lights out/nothing works	6	7	8						
One Push Button fails to operate Flippers			9,10	5					
Both Push Buttons fail to operate Flippers		7		5			12,11	9	
Lights on but machine does not operate		7							14
Flippers work poorly				5	24	17		25	
Sling-Shot Kicker does not work		7	1	13			12		
Sling-Shot Kicker works poorly				13	24	17		25	
Rollovers do not work			1	13					
Ball Out-Hole Kicker does not work		7	1	13			12		
Ball Out-Hole Kicker not strong enough					18	17			
Single Lamp out			1				15,16		
One Flipper weak				4					
Energizing Flipper blows fuse							3		
Energizing Thumper, Sling-Shot, Out-Hole Kicker, Replay Knocker, etc. blows fuse							2		
Drop Target does not score			1	13					
1 Drop Target does not return			1	13	24	17	12		
"No Double Bonus" All Drop Targets do not return			1	13					
Thumper Bumper does not score			1	13					
Thumper Bumper action slow				13	24	17		25	
Thumper Bumper stays on and then shuts off for the rest of the game				13					

WARNING: You must touch System Ground before attempting adjustments

PROBLEM DESCRIPTION	NO POWER FROM AC OUTLET	BLOWN FUSE	ELECTRICAL CONNECTION	SWITCH CONTACT ADJUSTMENT	MECHANICAL ADJUSTMENT	HARDWARE LOOSE OR BROKEN	FAILED ELECTRICAL PART	FAILED MECHANICAL PART	FAILED MAIN LOGIC
Thumper Bumper does not energize but scores			1				12		
Gate does not open				13					
Gate does not close			1	13			12		
500 & 1000 Pt. Targets do not work			1	13					
Replay Kicker does not sound			21				12		
Score does not stop flashing			1	13					
Line-Em-Up does not advance during game			21						
Line-Em-Up does not work at game over			19		19				
Does not give replay for high score			19		19				
Does not give replay for Line-Em-Up			19		19				
Does not accept coin									
Credits do not count down to start new game			1	13					23
Gives wrong number of credits			19		19				
Accepts coin but does not give credit			1		20				
Credit display not lit		7							
Score Unit will not score			21				22		
Score Unit changes score intermittently							22		
Score Unit Display not lit			21						
All Score Units not lit		7	21						

1 When trouble-shooting a problem dealing with switch contact or electrical connection, always begin by going to TEST MODE TWO (paragraph 7.3.2). In this way the machine itself can tell if it is seeing a switch closure. Check solder joints at switch or lamp socket. Check each connector in harness making sure that it is firmly connected. Remove P.C. Board from game, and check for residue at each contact along edge, especially the contact which pertains to the particular problem.

It is important to note that, if a switch gets stuck during game play, it may impair any or all other functions of the game. Do NOT mistake this for a bad connection in the other switches. REMEMBER: Identify the stuck switch by using TEST MODE TWO, paragraph 7.3.2!

2 A diode is located on each solenoid. If the diode is shorted, then a fuse will blow when the solenoid is activated. Be careful to observe polarity.

3 A terminal strip containing two diodes is located adjacent to each flipper. If either diode is shorted, then a fuse will blow upon actuating the flipper. Replace both diodes, and be careful to observe polarity.

4 Located on each flipper assembly is a switch which should be closed until the end of the flipper stroke. When the flipper reaches the top of its stroke, this switch opens to approximately 1/32" (see illustration #4-C).

Clean contacts if necessary. Check all solder joints on flippers and terminal strip.

5 Flipper button should close contacts firmly. Clean and adjust contacts as described in paragraph 8.5.

6 AC cord should be firmly inserted in wall. Verify that wall outlet is good by connecting another appliance in its place.

7 Verify all fuses in power supply are good.

8 All connectors on power supply should be firmly connected.

9 All connectors in harness should be firmly connected.

10 Check all solder connections on switch.

11 Check flipper power relay by going to TEST MODE NINE (paragraph 7.3.9). It should energize periodically. If it does not, and is good, the problem is either #1 or #12.

12 Located on Main Logic Board is a section of drivers. All solenoids (except flippers), flipper power relay, coin counter and one set of four DC lamps are activated by one of these drivers. Each driver is turned on as follows:

The pulse coming from one line of an output port on a MOS IC goes into an inverter. When it goes low, the inverter output goes high and turns on a small transistor (6531 or 4400) through a 270 resistor. This transistor in turn drives a larger transistor (tip 3055).

(Continued--)

9.2

When this transistor turns on, its collector goes from approximately 32 VDC to .6 VDC, and thus drives its load (solenoid).

NOTE: When a tip 3055 burns out, it is usually caused by overloading. Often the cause is a diode short-out. This condition should ALWAYS be corrected first.

ALWAYS replace both 6531 and tip 3055 when one fails.

13 Switch contacts should be normally OPEN and set at approximately 1/32". Contacts should be cleaned and adjusted as outlined in paragraph 8.5.

14 Go to discussion on re-set circuitry in paragraph 8.1.

15 Go to discussion on lamps in paragraph 8.3.

16 Check to see if bulb is good by placing it in a known good location.

17 After prolonged use, screws may work themselves loose. Tighten where necessary.

18 Solenoid (coil) mounting bracket should form 90-degree angle with PLAYFIELD. Adjust if bent. Spring tension on plunger should be only enough to hold plunger up.

Too much tension will result in ball not reaching shooter. Kicker should be aligned so that ball rolls straight up alley to shooter.

19 Check jumpers in program section of computer board as shown in illustration #2-A.

20 Coin switch should be activated fully by coin. Verify by going to TEST MODE THREE ... DROP A COIN IN several times.

21 Check each connector in harness making sure that it is firmly connected. Remove P. C. Board from game, check for residue at each contact along edge, especially the contact that pertains to your particular problem. Clean residue.

22 Exchange position of score unit to see if the unit itself is bad. Replace as necessary.

23 On the back of P. C. Board are jumper wires that directly affect the performance of the credit switch. They should be thoroughly checked in order to be sure that they are not shorting out any other connections. ...also be sure that they are firmly connected.

24 Each solenoid has a plunger, sleeve and spring as shown in illustration #4-B. This area should be lubricated periodically with silicone spray or equivalent to permit smooth action.

25 Plunger and sleeve should be checked periodically for wear. After prolonged use it may be necessary to replace one or both.

10.0 HOW TO KEEP YOUR MACHINE LOOKING NEW

10.0

The PLAYBOARD on the game has an improved finish with excellent wearing qualities.

WARNING: Do NOT, under any circumstances, clean the board with water, water-and-soap solutions, or abrasive-containing cleaner!

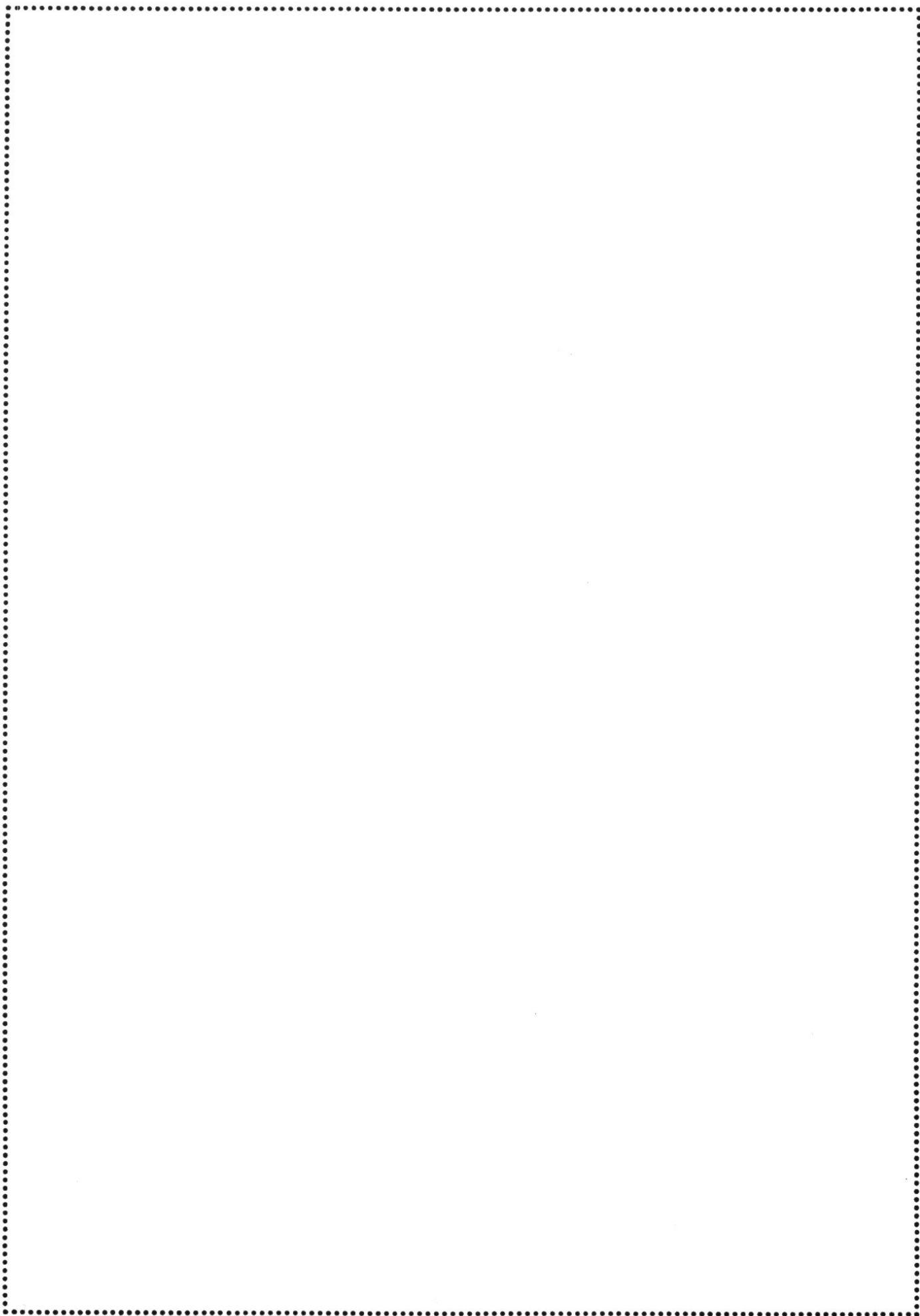
Water will weaken the adherence of the paint to the board, and abrasives shorten the life of the board by many thousands of plays. A wax cleaner with negligible abrasive contents used lightly but frequently will extend the life of the board to its full capabilities.

The SCORE GLASS is made from plexiglass, which is extremely easy to mar or damage. The writing on the surface is painted on . . . DO NOT USE ANY ALCOHOL-BASED SOLUTION to clean the surface! We recommend a soft water-dampened cloth used lightly only when necessary.

The CABINET is covered almost entirely with formica. Do NOT use any furniture polish that contains OIL. Such polish would cause a "build-up", which would detract from the appearance of this machine.

To take care of the glass which covers the PLAYFIELD, you may use any good glass cleaner.

Do NOT use silicone spray or similar lubricants except as recommended in this manual for specific areas.



ORDER FORM

Order # _____

DATE ORDERED _____

CUSTOMER _____

DATE NEEDED _____

NAME _____

ADDRESS _____

SHIP VIA _____

SHIP TO _____

METHOD OF PAYMENT _____

ITEM	PART NUMBER	DESCRIPTION	QUANTITY	GAME SERIAL NO.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.